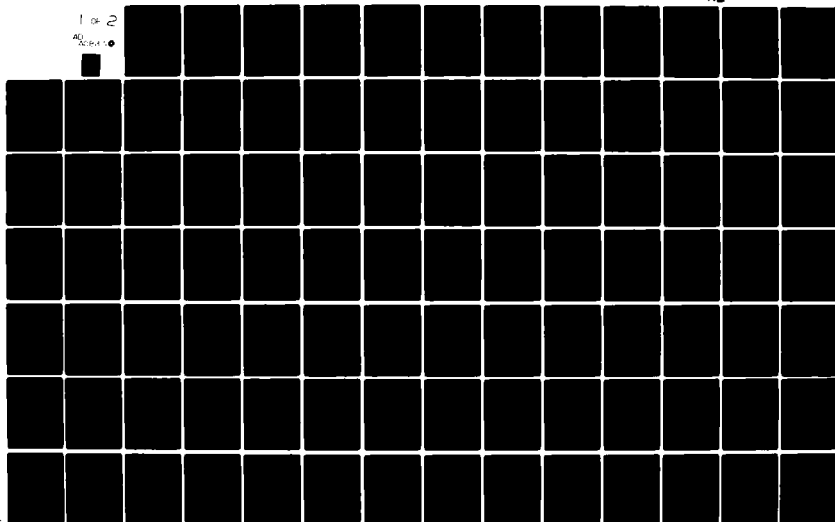


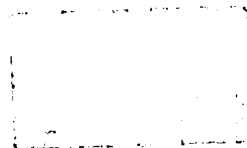
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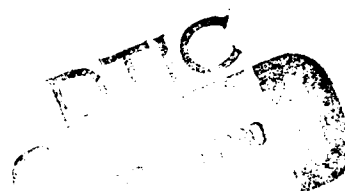
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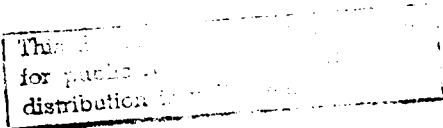


THE MODERATING EFFECTS OF GROUP
MEMBERSHIP AND GROWTH NEED STRENGTH
ON THE RELATIONSHIPS
BETWEEN JOB CHARACTERISTICS AND
JOB SATISFACTION, JOB INVOLVEMENT
AND INTRINSIC MOTIVATION

Master's Thesis

AFIT/GSM-79D-17

David L. Henson
Captain USAF



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6 THE MODERATING EFFECTS OF GROUP MEMBERSHIP AND
GROWTH NEED STRENGTH ON THE RELATIONSHIPS BETWEEN
JOB CHARACTERISTICS AND JOB SATISFACTION,
JOB INVOLVEMENT, AND INTRINSIC MOTIVATION.

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Presented to the Faculty of the School of Engineering
of the Air Force Institute of Technology
Air University

in Partial Fulfillment of the
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Master of Science

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by

10 David L. Henson, B.S.
Captain USAF

Graduate Systems Management

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Preface

This research was performed for two reasons. First, it was done in partial fulfillment of the requirements for a Master of Science degree in Systems Management from the Air Force Institute of Technology (AFIT). Secondly, it was done to satisfy a personal interest regarding the job characteristics and the job outcomes of organizations within a Systems Program Office environment.

This research could not have been accomplished without the assistance of many individuals and organizations. First, I wish to thank the eight organizations within the Aeronautical Systems Division for their permission to administer the survey upon which much of this thesis is based. These organizations are (1) the Deputy for Aeronautical Equipment, (2) the Deputy for the A-10, (3) the Deputy for Engineering, (4) the Deputy for the F-15, (5) the Deputy for the F-16, (6) the Deputy for Propulsion, (7) the Deputy for Strategic Systems, and (8) the Deputy for Systems. Also, I wish to express my appreciation to the personnel of these organizations for their cooperation and promptness in completing the questionnaires.

Next, I wish to express my appreciation to Dr. Joseph Cain, my advisor, whose assistance and encouragement proved invaluable during this research, and to Dr. Saul Young, who served as reader for this study effort.

Finally, and most importantly, I wish to thank my wife, Dianne, for her support, her encouragement, and her time spent typing and editing this thesis. In many ways, this thesis is as much a result of her efforts as it is a result of mine.

David L. Henson

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Abstract

The primary purpose of this thesis is to investigate the moderating effects of organizational differences and individual differences on the relationships existing between job characteristics and intrinsic motivation, job involvement, and job satisfaction. Measures used to describe the job characteristics and intrinsic motivation are derived from the short form version of the Job Diagnostic Survey (JDS) developed by Hackman and Oldham (1974). The measures used to describe the job involvement and job satisfaction are derived from scales developed by Lodahl and Kejner (1965) and Hoppock (1935), respectively.

A survey was distributed to 872 officers, grade 0-1 through 0-5, who were members of 8 Systems Program Offices (SPO) within the Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio. In order to obtain meaningful responses based upon adequate job experience, only respondents working at their present jobs longer than six months were included in the data base. Of the 579 surveys returned, 409 met this arbitrary time limit and were usable for data analysis.

Analysis of the data confirmed that a positive relationship did exist between the objective job characteristics and the outcomes of job satisfaction, job involvement, and

intrinsic motivation. This relationship, however, was not moderated by either organizational or individual differences.

Organizational and individual differences did appear to exert a moderating effect on the levels of individual job characteristics, the overall Motivating Potential Score (MPS), and the outcomes of job satisfaction, job involvement, and intrinsic motivation.

THE MODERATING EFFECTS OF GROUP MEMBERSHIP AND
GROWTH NEED STRENGTH ON THE RELATIONSHIPS BETWEEN
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I. Introduction

The elimination of the military draft system has forced the Air Force, as well as other services, to compete more directly with private industry for those people entering the job market. The number of American males of prime military age (17-21) peaked in 1978 and will continue to decline until approximately 1991 (Broedling and Penn, 1978:27). Increasingly complex systems within the Air Force also impose increasingly longer training requirements. Obviously, then, if qualified people have become harder to recruit and train, it is even more important to keep those people once they have been recruited and trained. As a result, the Air Force has become increasingly interested in concepts such as job satisfaction, job involvement, job enrichment, and work motivation. Given that the Air Force cannot generally match the extrinsic reward system of the private sector (with the possible exception of the 20-year retirement system), it seems logical for the Air Force to concentrate its efforts on the intrinsic elements of those concepts mentioned above. Several general

areas have been identified by Pritchard and Montagno (1978) in which increased knowledge of intrinsic techniques could yield significant benefits. The job characteristics model developed by Hackman and Oldham (1976) incorporates two of these general areas, task characteristics and individual characteristics, and offers a promising approach which may be effectively utilized by the Air Force.

Hackman and Oldham's Job Characteristics Model

The Hackman and Oldham model is based upon previous work done by Turner and Lawrence (1965) and Hackman and Lawler (1971). The basic job characteristics model is presented in Figure 1. In general, five core job dimensions lead to three psychological states which, in turn, lead to several personal and work outcomes. The links between the job dimensions and the psychological states, and between the psychological states and the outcomes are hypothesized to be moderated by individual differences in growth need strength.

The three psychological states are defined as follows:

Experienced Meaningfulness of Work: The degree to which the individual experiences the job as one which is generally meaningful, valuable, and worthwhile.

Experienced Responsibility for Work Outcomes: The degree to which the individual feels personally accountable and responsible for the results of the work he or she does.

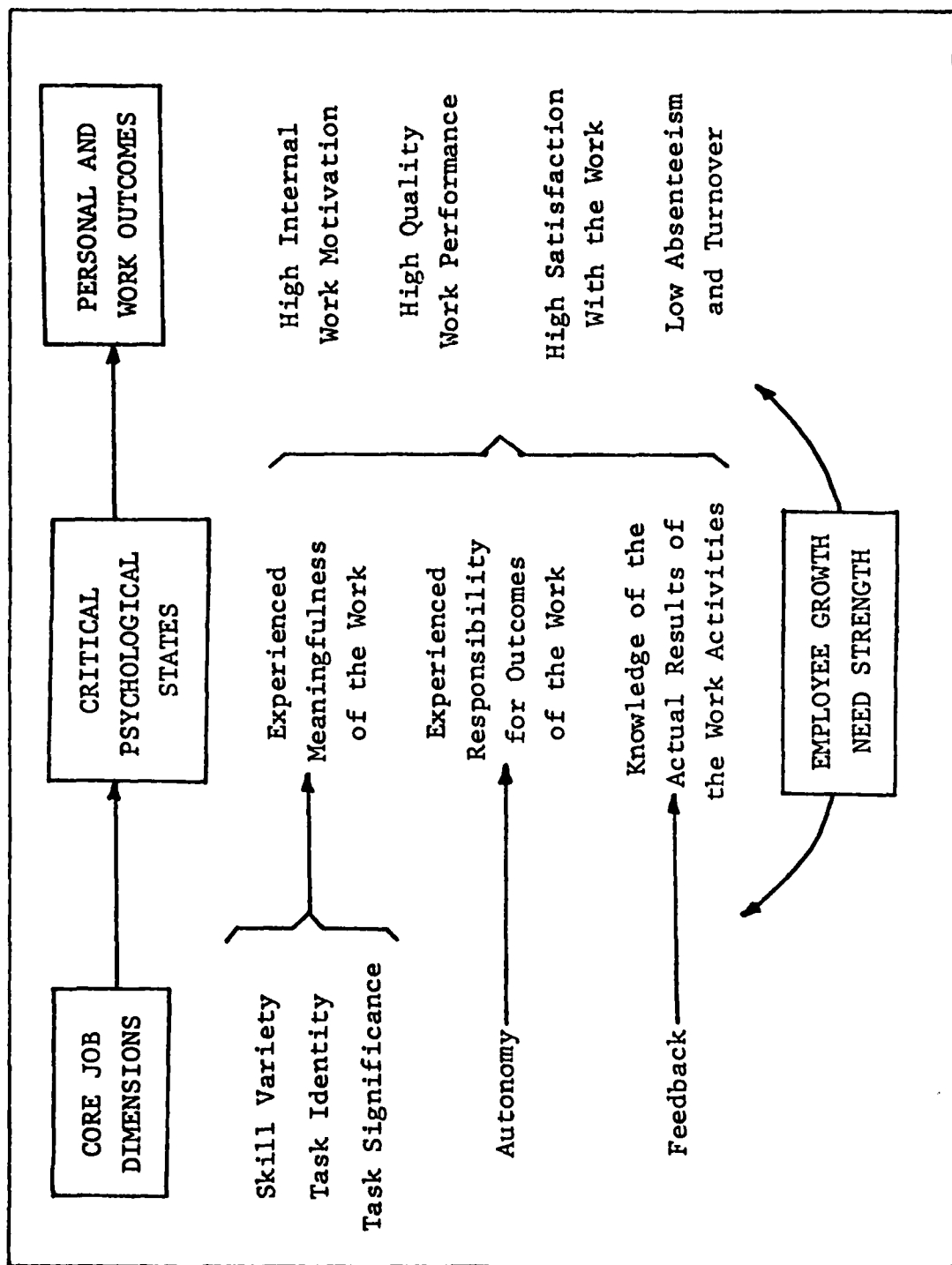


Figure 1. The Relationships Among the Core Job Dimensions, the Critical Psychological States, and Outcomes (Hackman and Oldham, 1974:3)

Knowledge of Results: The degree to which the individual knows and understands, on a continuous basis, how effectively he or she is performing the job. (Hackman and Oldham, 1976:256-257)

All three psychological states combine in a multiplicative manner to create a self-perpetuating cycle of positive work motivation powered by intrinsic rewards. This cycle is predicted to continue until one or more of the psychological states are missing or until the individual no longer values the intrinsic rewards.

The core job dimensions (skill variety, task identity, task significance, autonomy, and feedback) are adapted directly from the six "Requisite Task Attributes" used by Turner and Lawrence (1965) and Hackman and Lawler (1971) to investigate the relationships between the nature of jobs and employee reactions to those jobs. Of these core dimensions, skill variety, task identity, and task significance contribute to the experienced meaningfulness of the work. Autonomy contributes to the experienced responsibility for work outcomes and feedback contributes to the knowledge of results.

The overall motivating potential of a job to prompt internal work motivation can be expressed as a Motivating Potential Score (MPS) defined by the following equation:

$$\text{MPS} = \frac{\text{Skill Variety} + \text{Task Identity} + \text{Task Significance}}{3} \times \text{Autonomy} \times \text{Feedback}$$

As can be seen from the equation, autonomy and feedback have a much heavier impact than any of the remaining three job characteristics. A near-zero score on either autonomy or feedback will reduce the overall MPS to near-zero. A near-zero score on one of the three job characteristics contributing to experienced meaningfulness cannot individually reduce the overall MPS to near-zero.

Statement of the Problem

The primary purpose of this thesis is to investigate the moderating effects of organizational differences and individual differences on the relationships existing between job characteristics and intrinsic motivation, job involvement, and job satisfaction. The target population for this investigation is drawn from military personnel assigned to several of the Systems Program Offices (SPO) within the Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio.

Measures used in this thesis to describe job characteristics and intrinsic motivation are derived from the short form version of the Job Diagnostic Survey (JDS) developed by Hackman and Oldham (1974). The measure used to describe job involvement is drawn from the 20-item

scale developed by Lodahl and Kejner (1965) and the measure used to describe job satisfaction is drawn from the 4-item scale developed by Hoppock (1935).

Although previous studies have investigated the moderating effect of differences in socialization (Turner and Lawrence, 1965; Hulin and Blood, 1968), differences of belief in the Protestant Work Ethic (Blood, 1969), differences in locus of control (Sims and Szilagyi, 1976), and differences in growth need strength (Hackman and Lawler, 1971; Wanous, 1974; Brief and Aldag, 1975), this thesis investigates only the moderating effect of individual differences in growth need strength. The measure used to describe growth need strength is derived from the short form version of the JDS.

The moderating effect of organizational differences is examined primarily through the mediums of perceived differences in external identification and perceived differences in the type and size of programs associated with particular organizations. For purposes of this study, two groups of SPOs are established based on the a priori determination of external identification and program characteristics. A super SPO group is composed of three SPOs judged high in external identification and associated with large, whole-item programs (F-15 SPO). A basket SPO group is composed

of five SPOs judged low in external identification and associated with smaller, component-type or support-type programs (Aeronautical Equipment SPO).

Hypotheses

The following hypotheses are tested in this thesis:

1. There is a positive relationship existing between the five core job dimensions and the outcomes of job satisfaction, job involvement, and intrinsic motivation.
2. Organizational differences moderate the relationship between the job dimensions and the outcomes.
3. Growth need strength moderates the relationship between the job dimensions and the outcomes.
4. The basket SPO group has a higher overall MPS than the super SPO group.
5. The basket SPO group is more job satisfied, job involved, and intrinsically motivated than the super SPO group.
6. Pilots in the super SPO group are more job satisfied, job involved, and intrinsically motivated than either navigators or nonrated personnel in the same group.
7. Navigators in the basket SPO group are more job satisfied, job involved, and intrinsically motivated than either pilots or nonrated personnel in the same group.
8. Program managers (27XX DAFSC) are more job satisfied, job involved, and intrinsically motivated than other types of specialty codes.

9. Individuals with higher growth need strengths have higher mean scores on the measures of core job dimensions, overall MPS, and outcomes than individuals with lower growth need strengths.

Hypothesis four is based upon this author's perception that the types of jobs associated with the basket SPO group have higher measures of skill variety, task identity, autonomy, and feedback than do the types of jobs associated with the super SPO group. Hypothesis five is based upon this author's perception that, given a higher overall MPS for the basket SPO group, the association between the MPS and the job outcomes will lead to higher measures of those outcomes for the basket SPO group. Hypotheses six and seven are based upon an interest of this author of the possible effects of the identification of different types of occupations with the two SPO groups. It is perceived by this author that since the super SPO group is associated with large, single-crewed (pilot only), whole-aircraft projects, pilots would more readily identify with the super SPO group; consequently, this difference in identification would be expressed by higher mean scores on the measured outcomes. Following the same line of reasoning, it is perceived by this author that navigators will more readily identify with the basket SPO group because this group tends to be associated with smaller, component or subsystem types of projects; this identification is expected to lead to higher mean scores on

the measured outcomes for navigators in the basket SPO group. Finally, it is perceived that specific job types may also demonstrate varying degrees of identification with the SPO concept. Hypothesis eight is based upon this author's perception that program managers more readily identify with the SPO concept and will demonstrate higher mean scores on the measured outcomes than other job types.

Assumptions

The first assumption to be made is that the measures used in this thesis are valid measures of job characteristics, growth need strength, job satisfaction, job involvement, and intrinsic motivation. Extensive validity studies have been performed in the past and are presented in detail in the next chapter.

A second assumption is that there is a minimum period of time required before an individual new to a job situation can make meaningful judgments about that job. Discussions with personnel working in the SPO environment led to an arbitrary definition of six months as that minimum time period. Consequently, all data from respondents with five months or less at their present job are assumed to be invalid and is excluded from all analyses.

Finally, it is assumed that the individuals surveyed represent an unbiased sample of the population and their responses are given truthfully and in terms of their individual perceptions.

Presentation Format

The following is an outline of the chapters presented in the remainder of this study:

Chapter 2: Background. This chapter presents a detailed literature review of similar work done in the areas of job dimensions, job satisfaction, job involvement, intrinsic motivation, and the moderating effects of group membership and growth need strength.

Chapter 3: Methodology. This chapter discusses the sample population, the questionnaire, and the various measures of job characteristics, individual characteristics, and outcomes. This chapter also describes the various tests utilized in the analysis of data for this study.

Chapter 4: Results. This chapter discusses the results of the hypothesis testing for this study.

Chapter 5: Conclusions and Recommendations. This final chapter attempts to interpret the results of this thesis and makes recommendations for further analysis based on the results.

II. Background

The purpose of this chapter is to provide a more detailed examination of the theory behind the Hackman and Oldham job characteristics model, and a more detailed discussion of the Hoppock measure of job satisfaction and the Lodahl and Kejner measure of job involvement. The results of several studies dealing with the effects of moderating variables are also presented. Finally, since a major portion of this thesis involves comparisons of various measures between organizations and subgroups, several studies dealing with the independence of the measures of job involvement, job satisfaction, and intrinsic motivation are presented.

Motivation-Hygiene Theory

The well known two-factor theory of Herzberg (Herzberg, et al, 1959; Herzberg, 1966) provides the foundation for much of the theory relevant to job design and job enrichment. This theory proposes that the primary determinants of employee satisfaction are factors intrinsic to the work itself. These intrinsic factors, called "motivators," act when present to increase motivation and job satisfaction; when absent, they act only rarely to cause dissatisfaction. Factors which are external or extrinsic to the work, called "hygiene" factors, act when absent to cause dissatisfaction; when present, these

"hygiene" factors do not lead to employee motivation and satisfaction. This suggests that a job should enhance employee motivation only to the extent that the job itself provides opportunities for achievement, recognition, responsibility, advancement, and personal growth in competence. Changes in factors external to the job should not lead to enhanced employee motivation.

Although the Herzberg theory has inspired several successful job-enlargement projects, there exist certain difficulties in its interpretation and application. A number of researchers have been unable to provide empirical support for the major tenets of the two-factor theory itself (Dunnette, et al, 1967; Hinton, 1968; King, 1970; Locke and Whiting, 1974; Ondrack, 1974). Hackman and Lawler (1971) emphasize two additional problems associated with the Herzberg theory: it does not specify, either conceptually or in actual application, how characteristics of individual employees interact with the presence or absence of the five motivating conditions to determine employee satisfaction, and it does not specify how the presence or absence of the five motivating conditions can be measured for existing jobs. At the very least, this second problem limits the degree to which the theory can be useful in designing job changes, or evaluating the effectiveness of job redesign efforts after changes have been made.

Job Characteristics and Individual Differences

In an effort to explicitly deal with the problem of measuring job characteristics, Turner and Lawrence (1965) developed operational measures of six "Requisite Task Attributes" which were predicted to relate positively to employee satisfaction and attendance. The six attributes are: (1) variety, (2) autonomy, (3) required social interaction, (4) opportunities for social interaction, (5) knowledge and skill required, and (6) responsibility. Analysis of scores on each of the attributes obtained for 47 different jobs revealed that the attributes were very closely related to each other. Consequently, a summary measure, the Requisite Task Attribute Index (RTA Index), was developed and used to test relationships between the nature of jobs and employee reactions to those jobs.

The expectation that employees working on jobs high on the RTA Index would have higher job satisfaction was not fully supported. In fact, the expected positive relationship between the RTA Index and employee satisfaction was found only for workers from factories located in small towns. Turner and Lawrence (1965) concluded that reactions to jobs high on the RAT Index were moderated by differences in cultural backgrounds of the employees. Subsequent research (Blood and Hulin, 1967; Hulin and Blook, 1968) has provided additional support for the concept that subcultural factors

can moderate the relationship between job characteristics and employees responses.

The data of Turner and Lawrence (1965), Blood and Hulin (1967), and Hulin and Blood (1968) indicate a requirement to approach the study of employee satisfaction and work design from an interactive point of view. It is important not only to understand and effectively measure job characteristics, but to understand how characteristics of individual employees affect the relationship between job characteristics and employee responses. A single global policy of job enrichment, for example, cannot be expected to be a panacea for all employee motivation and satisfaction problems.

An Interactive Approach

A study by Hackman and Lawler (1971) provided further support of the interactive nature of job characteristics and individual differences. Based on the expectancy theory of motivation as formulated by Lewin (1938), Vroom (1964), and Porter and Lawler (1968), five propositions were developed by Hackman and Lawler (1971) which specifically addressed job characteristics and employee reactions.

1. The likelihood that an employee will engage in some given pattern of behavior is enhanced to the degree that he believes engaging in that behavior will provide him with outcomes he values. Relevant outcomes can be both extrinsic and intrinsic; the only requirement is that the

outcomes must be valued by the employee. When an employee anticipates obtaining some valued outcome as a result of contemplated behavior, that outcome may be termed an incentive to engage in that behavior.

2. Outcomes are valued by the employee to the extent that they satisfy physiological or psychological needs of the employee, or to the extent that they lead to other outcomes which are perceived to satisfy such needs. If an outcome does not somehow remain linked to satisfaction, the outcome will cease to be valued and will not continue to serve as an incentive.

3. To the extent that work conditions can be arranged so that employees can satisfy their own needs by working effectively toward organizational goals, employee work motivation will be enhanced.

4. Most lower-level needs (e.g., physical well-being and security) are reasonably well-satisfied for the majority of contemporary workers on a continuing basis; consequently, these lower-level needs will not serve as motivational incentives except under unusual circumstances. However, this is not the case for certain higher-order needs (e.g., personal growth and development or feelings of worthwhile accomplishment). An individual may experience higher-order need satisfactions on a continuing basis without decreasing the desire for additional satisfactions of these needs. In fact, Alderfer (1969) believes that additional

satisfaction of higher-order needs actually increases the strength of those higher-order needs. This suggests that the opportunities for higher-order need satisfaction could serve as powerful incentives on a continuing, long-term basis for many employees (Porter, et al, 1975).

5. Individuals who are capable of higher order need satisfaction will experience such satisfaction when they learn that they have, through their own efforts, accomplished something perceived to be worthwhile or meaningful (Argyris, 1964). Specifically, individuals who desire higher-order need satisfaction should be most likely to obtain them when they work effectively on jobs which (1) allow the employees to feel personally responsible for an identifiable and meaningful portion of the work, (2) provide work outcomes which are experienced as worthwhile or intrinsically meaningful, and (3) provide feedback about what is accomplished. Increased effort and effectiveness by individuals working on jobs with the above characteristics leads to increased opportunities for higher-order need satisfactions and increased incentives for continued effective performance.

To operationalize the general job characteristics described above, Hackman and Lawler (1971) defined four "core" dimensions which were adapted from the Requisite Task Attributes previously used by Turner and Lawrence

(1965). These "core" dimensions are (1) autonomy, (2) task identity, (3) variety, and (4) feedback.

The autonomy dimension is designed to describe the degree to which workers feel personal responsibility for their work outcomes. These feelings of personal responsibility can occur for individual effort or for team efforts; the only requirement is that the individual or team members feel that they own the outcomes of their work.

The task identity dimension is designed to describe one of the factors necessary for work to be experienced as meaningful for employees who desire higher-order need satisfaction. This dimension describes the degree to which the job requires completion of a whole and identifiable piece of work; that is, doing a job with a very clear perceived cycle of closure.

The variety dimension is designed to describe a second factor necessary for work to be experienced as meaningful. This dimension describes the degree to which a job requires a worker to accomplish something by using a number of different skills and talents which are personally valued by the worker.

The final "core" dimension, feedback, is designed to describe the degree to which the job provides clear and direct information about the effectiveness of employee performance. It is important to point out that feedback must

be present in a form that is not only clear and direct, but believable to the employee.

In terms of "core" dimensions, then, individuals who desire higher-order need satisfaction will be able to obtain meaningful personal satisfaction when they perform effectively on jobs which they perceive as high on autonomy, task identity, variety, and feedback (Hackman and Lawler, 1971).

Refinement of the Job Characteristics Model

In an effort to extend and refine the job characteristics model developed by Hackman and Lawler (1971), Hackman and Oldham (1975, 1976) added an additional "core" dimension so that their model includes five "core" dimensions. The additional dimension, task significance, was added as a contributor to the psychological state of experienced meaningfulness of the work. Consequently, skill variety, task identity, and task significance all combine additively to determine the psychological meaningfulness of a job. As mentioned in the previous chapter, the overall motivating potential of a job to prompt intrinsic work motivation is expressed by Hackman and Oldham (1975, 1976) as a Motivating Potential Score (MPS) defined by the following equation:

$$\text{MPS} = \frac{\text{Skill Variety} + \text{Task Identity} + \text{Task Significance}}{3} \times \text{Autonomy} \times \text{Feedback}$$

In addition to expanding the "core" dimensions of the job characteristics model, Hackman and Oldham (1975, 1976) provided substantial support that growth need strength was the key variable moderating the relationship between job characteristics and employee outcomes. The growth need scores of 658 employees were separated into quartiles with the top quartile (n = 170) identified as the high growth need strength (GNS) group and the bottom quartile (n = 186) identified as the low growth need strength (GNS) group. In all cases the correlations for the high GNS group were higher than the low GNS group and these differences in correlations were all statistically significant (except for task identity). Comparisons of the correlations between the psychological states and the outcomes of intrinsic motivation and general satisfaction were also made. As before, the differences in the magnitude of the correlations for the high GNS group and the low GNS group were in the predicted direction and statistically significant. These results provided substantial support of the proposition that growth need strength exerts a moderating effect both at the link between the job dimensions and the psychological states, and at the link between the psychological states and the work or personal outcomes (Hackman and Oldham, 1976:271).

The Job Diagnostic Survey

In addition to their work on the development of an expanded job characteristic model, Hackman and Oldham (1975) also developed an instrument, the Job Diagnostic Survey (JDS), to facilitate testing that model. The JDS was designed to be a standardized instrument useful for both diagnosis of jobs prior to redesign (if required), and evaluation of the effects induced by redesign. Measures of the five "core" dimensions (skill variety, task identity, task significance, autonomy, and feedback from the job itself) are provided by the JDS. Additionally, measures of personal outcomes such as general job satisfaction and intrinsic motivation are provided by the JDS. Since growth need strength is predicted to moderate the relationship between job dimensions and personal outcomes, a measure of growth need strength is also provided by the JDS.

Based on data obtained from 658 employees working on 62 different jobs in 7 different organizations, the JDS was shown to have generally satisfactory psychometric characteristics, and summary scores derived from the instrument have been shown to have substantive validity (Hackman and Oldham, 1974:14). Table 1 presents the internal consistency reliabilities of each of the summary score scales measured by the JDS. Internal consistency reliabilities range from a high of .88 (growth need strength) to a low of .59 (task identity) and are generally considered satisfactory.

Table I
Reliabilities of the JDS Scales

<u>JOB DIMENSIONS</u>	<u>INTERNAL CONSISTENCY RELIABILITY</u>
Skill Variety	.71
Task Identity	.59
Task Significance	.66
Autonomy	.66
Feedback from Job Itself	.71
<u>AFFECTIVE RESPONSES TO THE JOB</u>	
General Satisfaction	.76
Intrinsic Motivation	.76
<u>GROWTH NEED STRENGTH</u>	
"Would Like" Format	.88

(Hackman and Oldham, 1974:18)

Means and standard deviations of the JDS scale scores across the 658 respondents are presented in Table II. The scale for the MPS ranges from 1 to 343, while all other scales range from 1 to 7. Mean JDS scores across the 62 jobs were computed by averaging the scores of respondents who worked on each job, and then computing the mean of these averages across all jobs for each scale. Since the scale means obtained across jobs did not differ substantially from

Table II
Means and Standard Deviations of JDS Scores

<u>JOB DIMENSIONS</u>	<u>MEAN</u>	<u>STANDARD DEVIATION</u>	<u>MEAN (ACROSS JOBS)</u>
Skill Variety	4.49	1.67	4.47
Task Identity	4.87	1.43	4.87
Task Significance	5.49	1.29	5.54
Autonomy	4.80	1.43	4.75
Feedback from Job Itself	4.98	1.41	4.96
MPS	128.31	72.73	120.68
<u>AFFECTIVE RESPONSES TO THE JOB</u>			
General Satisfaction	4.62	1.18	4.57
Intrinsic Motivation	5.39	0.96	5.34
<u>GROWTH NEED STRENGTH</u>			
"Would Like" Format	5.62	1.28	5.51
<u>N</u>	658		62
Notes:			
a. Scales for all measurements except MPS range from 1 to 7.			
b. Scale for MPS ranges from 1 to 343.			

(Hackman and Oldham, 1974:22)

those obtained across all respondents, it was concluded the different numbers of respondents holding the various jobs did not significantly affect the mean scale scores.

Intercorrelations among the JDS scales across all 658 respondents are presented in Table III. Although the job

Table III
Intercorrelations Among JDS Scale Scores Across All Respondents

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>
1. Skill Variety	-								
2. Task Identity	.16	-							
3. Task Significance	.21	.20	-						
4. Autonomy	.51	.38	.22	-					
5. Feedback from Job	.32	.26	.26	.34	-				
6. MPS	.62	.51	.41	.80	.72	-			
7. General Satisfaction	.42	.22	.24	.43	.37	.49	-		
8. Intrinsic Motivation	.42	.22	.32	.33	.36	.46	.51	-	
9. Growth Need Strength	.22	.08	.03	.10	.11	.19	.04	.19	-
Note: N = 658 Correlations > .10 are significant at the .01 level (two-tailed)									

(Hackman and Oldham, 1974:24)

dimensions themselves are moderately intercorrelated, this is seen as not detracting from their usefulness as separate job dimensions; however, their non-independence should be recognized and taken into account in the interpretation of job scores on a given dimension.

Hoppock's Job Satisfaction Measure

Developed in 1935, Hoppock's measure consists of a battery of four questions related to various aspects of a person's satisfaction with his job. Table IV presents the four Hoppock questions as used in this survey. The job satisfaction score is obtained by summing responses to the four questions (after first reversing the scores for the last two questions), yielding a score between 4 and 28.

Although there exist several more sophisticated standardized instruments such as the Job Descriptive Index (JDI) (Smigh, Kendall, and Hulin, 1969), the Hoppock job satisfaction measure has been shown to perform well when examined in terms of its construct and convergent validities and reliability (McNichols, Stahl, and Manley, 1978). McNichols, Stahl, and Manley (1978) based their analysis on data obtained from four large-scale survey efforts which used the Hoppock measure. These survey efforts covered employees of a public utility company, Department of Defense, civil service employees, and military personnel in all grades.

Principal component analysis was used to determine if the four questions appear to be measures of a single factor and to evaluate the appropriateness of equal weighting for the four questions. The first principal component explained from 58 percent to 76 percent of the total variance in the four samples examined and was the only factor with an eigenvalue greater than 1.0. The factor loadings on the first

Table IV
Hoppock's Job Satisfaction Questions

- A. Choose the one of the following statements which best tells how well you like your job.
1. I hate it.
 2. I dislike it.
 3. I don't like it.
 4. I am indifferent to it.
 5. I like it.
 6. I am enthusiastic about it.
 7. I love it.
- B. Which one of the following best tells how you feel about changing your job?
1. I would quit this job at once if I could.
 2. I would take almost any other job in which I could earn as much as I am earning now.
 3. I would like to change both my job and my occupation.
 4. I would like to exchange my job for another one.
 5. I am not eager to change my job, but I would do so if I could get a better job.
 6. I cannot think of any job for which I would exchange.
 7. I would not exchange my job for any other.
- C. Which one of the following shows how you think you compare with other people?
1. No one likes his job better than I like mine.
 2. I like my job much better than most people like theirs.
 3. I like my job better than most people like theirs.
 4. I like my job about as well as most people like theirs.
 5. I dislike my job more than most people dislike theirs.
 6. I dislike my job much more than most people dislike theirs.
 7. No one dislikes his job more than I dislike mine.
- D. Which of the following shows how much of the time you feel satisfied with your job?
1. All the time.
 2. Most of the time.
 3. A good deal of the time.
 4. About half of the time.
 5. Occasionally.
 6. Seldom.
 7. Never.

factor range from .65 to .92 across the four samples; consequently, all four questions are important in deriving the overall measure. Since all four questions have factor loadings on the first factor which are nearly equal in magnitude, it appears reasonable to assign equal weights to each of the questions.

To examine the convergent validity of the Hoppock measure, McNichols, Stahl, and Manley (1978) compared it with the JDI scores for a survey sample which dealt with job satisfaction of military personnel in a strategic missile wing ($n = 628$). Through correlation analysis, it was shown that the Hoppock measure was significantly associated with all five of the JDI scales of work, pay, promotion, supervisor, and co-workers.

McNichols, Stahl, and Manley then used coefficient alpha (Nunnally, 1967) to estimate the reliability, or internal consistency, of Hoppock's measure for each of the four samples. The alpha values ranged from .758 to .890 for the four samples and compare favorably with other measures of job satisfaction.

Lodahl and Kejner's Job Involvement Measure

Possibly as a result of the current interest in job enrichment, the concept of job involvement has received much empirical and theoretical attention. In a review of the job involvement literature, Rabinowitz and Hall (1977) have concluded that the various terms used such as central life inter-

ests, work role involvement, ego-involvement, ego-involved performance, and job involvement have all appeared to describe two different conceptual approaches to job involvement. These two conceptual approaches are (1) job involvement as a performance-self-esteem contingency, and (2) job involvement as a component of self-image. Both of these approaches can be traced back to research done by Lodahl and Kejner (1965) in their efforts to define job involvement, develop a scale to measure it, and gather evidence on the reliability and validity of that scale.

Lodahl and Kejner first defined job involvement as the degree to which a person's performance at work affects his self-esteem. These authors describe the job-involved person as one for whom work is a very important part of life, and as one who is affected very much personally by his job situation as a whole. The non-involved person, however, is not greatly affected by the kind of work he does or how well he does it. Vroom (1962) supports this conceptual approach when he describes a person as ego-involved in a job or task to the extent his self-esteem is affected by his perceived level of performance. This particular conceptual approach, however, is considered by Lawler and Hall (1970) to be a measure of intrinsic motivation and not job involvement.

Although the performance-self-esteem contingency definition was provided by Lodahl and Kejner in the body of their 1965 article, these authors also provided an additional

definition of job involvement in the abstract to that article. In this abstract, they define job involvement as the degree to which a person is identified psychologically with his work, or the importance of work in his total self-image. It is this second definition that Lawler and Hall (1970), among others, have identified as representative of job involvement.

To develop their scale, Lodahl and Kejner initially collected 110 statements potentially related to job involvement. These statements were drawn from interview protocols, existing questionnaires, other researchers, or merely invented by the two authors. After elimination of duplications, 87 statements were submitted to a number of judges considered "expert" by Lodahl and Kejner. These judges included 11 psychologists, 3 sociologists, and 8 second-year graduate students. Based upon statistical analysis of the data supplied by the judges, 47 statements were eliminated.

The remaining 40 statements, or items, were then cast into a Likert format and administered to 137 nursing personnel. Factor analysis of the data from the nurses produced 7 factors accounting for 77 percent of the obtained communality. These 7 factors were further reduced to 5 factors which explained 92 percent of the variance in the total involvement scores. By considering the item-total correlations (individual item to overall score over the 40 items), the communality of an item, and the factorial clarity, the set of 40 items was reduced to 20 items. This 20-item scale was then administered

to 70 engineers and compared to data from the nurses which had been rescored for the 20-item scale. Table V presents the factorial structure for both the engineers (four factors) and the nurses (three factors). Based upon the similarity of the factorial structure across the two samples, it was concluded that job involvement, as measured by the 20-item scale, was multidimensional with at least three probable dimensions. These dimensions, however, were not clearly defined or labeled.

Corrected (Spearman-Brown formula) split-half reliability for the 20-item scale was .72 for the nurses and .80 for the engineers. When the 6 items scoring highest on the first (unrotated) principal component in both samples were rescored as a single scale, the corrected split-half reliability was estimated to be .73. This 6-item scale was composed of items 3, 6, 8, 11, 15, and 18 of Table V and explained 76 percent of the variance in the 20-item scale. In a study of 63 government research employees, Goodman, Furcon, and Rose (1969) demonstrated a scale reliability of .83 and both convergent and discriminant validity for the Lodahl and Kejner job involvement measure.

Uncorrelated Outcome Measures

As mentioned earlier, Rabinowitz and Hall (1977) identified a degree of ambiguity existing in the literature regarding the theoretical definition and measurement of job involvement,

Table V
Factorial Structure of 20-Item Scale

Item	<u>Factors</u>			
	<u>Nurses</u>		<u>Engineers</u>	
	1	2	3	4
1. I'll stay overtime to finish a job, even if I'm not paid for it.	-.04	-.04	.64	-.23
2. You can measure a person pretty well by how good a job he does.	-.06	.00	.56	-.20
3. The major satisfaction in my life comes from my job.	-.52	.14	.31	-.81
4. For me, mornings at work really fly by.	-.02	.15	.61	-.13
5. I usually show up for work a little early, to get things ready.	-.58	.17	-.11	-.28
6. The most important things that happen to me involve my work.	-.63	.13	.11	-.83
7. Sometimes I lie awake at night thinking ahead to the next day's work.	-.62	-.18	-.28	-.13
8. I'm really a perfectionist about my work.	-.52	.03	.14	-.40
9. I feel depressed when I fail at something connected with my work.	-.47	-.34	.07	.17
10. I have other activities more important than my work.	.35	-.32	.23	.79

(Table V cont.)

Item	Factors							
	<u>Nurses</u>				<u>Engineers</u>			
	1	2	3	1	2	3	4	
11. I live, eat, and breathe my job.	-.63	.07	.11	-.77	.03	.02	-.16	
12. I would probably keep working even if I didn't need the money.	-.09	.06	.39	.09	-.12	-.68	.00	
13. Quite often I feel like staying home from work instead of coming in.	.11	-.62	-.22	.14	.64	-.30	.15	
14. To me, work is only a small part of who I am.	.26	-.22	-.16	.78	.23	.12	-.07	
15. I am very much involved personally in my work.	-.51	.26	.15	-.51	-.39	-.24	-.28	
16. I avoid taking on extra duties and responsibilities in my work.	.04	-.61	-.04	.25	.40	.56	-.04	
17. I used to be more ambitious about my work than I am now.	.07	-.72	.09	.00	.82	.22	-.06	
18. Most things in life are more important than work.	.33	-.42	.02	.35	.55	.23	-.42	
19. I used to care more about my work, but now other things are more important to me.	.12	-.71	.16	.25	.70	.11	-.14	
20. Sometimes I'd like to kick myself for the mistakes I make in my work.	-.13	-.25	.65	-.13	-.42	.36	-.48	
21. Total job involvement score (over all 20 items).	-.77	.48	.40	-.71	-.56	-.26	-.30	

(Lodahl and Kejner, 1965:29)

job satisfaction, and intrinsic motivation. In an effort to resolve this ambiguity, several studies have investigated the correlations of these job attitude factors (Cummings and Bigelow, 1976; Gechman and Wiener, 1975; Lawler and Hall, 1970; Schwyhart and Smith, 1972; Weissenberg and Gruenfeld, 1968).

In their 1970 study, Lawler and Hall argued that much of the ambiguity associated with Lodahl and Kejner's (1965) two definitions of job involvement could be explained. Lawler and Hall believed that 19 of the 20 items of Lodahl and Kejner's job involvement measure tapped the psychological identification with work, rather than the performance-self-esteem contingency. They also believed that the performance-self-esteem contingency could be better expressed by Lawler's (1969) definition of intrinsic motivation: the degree to which an employee is motivated to perform is due to expected subjective rewards or feelings received as a result of performing well. Through this distinction, Lawler and Hall proposed that statements about the psychological importance of work should be considered measures of job involvement, while statements about the consequences of performance for feelings of self-esteem, growth, and competence should be considered measures of intrinsic motivation (Lawler and Hall, 1970:306).

To support their proposition of uncorrelated outcome measures, Lawler and Hall (1970) used results of factor analysis

of data obtained from 291 scientists in 22 research and development laboratories. This analysis was performed on six questions designed to measure satisfaction with self-actualization, the six questions from the shortened version of the Lodahl and Kejner job involvement measure, and four questions designed to measure intrinsic motivation. Table VI presents the results of the principal component analysis (with Varimax rotation) for the 16 attitude items. The three-factor solution shown accounted for 48 percent of the variance and provided statistical support for the proposition of independent attitude factors of satisfaction, involvement, and intrinsic motivation.

Cummings and Bigelow (1976) also investigated the correlations of these attitude factors with factor analysis of data obtained from 96 blue-collar workers in a large forging company. Cummings and Bigelow used the same 16 questions previously used by Lawler and Hall (1970). Table VII presents the results of the principal component analysis (with Varimax rotation) for the 16 attitude items. The three-factor solution shown accounted for 64 percent of the variance and also supports the proposition that the attitude factors of satisfaction, involvement, and intrinsic motivation are uncorrelated and distinct variables.

Based upon the results mentioned above, it appears reasonable to conclude that conceptually distinct and empirically uncorrelated measures for satisfaction, involve-

Table VI
Results of Lawler and Hall Factor Analysis of Sixteen Items

Item	Factor		
	1	2	3
1. The feeling of self-fulfillment a person gets from being in my position.	.81	.02	-.14
2. The opportunity, in my job, for participation in the setting of goals.	.77	.11	.11
3. The opportunity, in my job, for participation in the determination of methods and procedures.	.70	.10	.03
4. The opportunity for independent thought and action in my position.	.70	.03	.07
5. The feeling of worthwhile accomplishment in my position.	.68	.02	-.11
6. The opportunities for personal growth and development in my position.	.64	.10	-.19
7. The major satisfaction in my life comes from my work.	.07	.84	-.06
8. The most important things that happen to me involve my job.	.10	.82	-.05
9. I live, eat, and breathe my job.	.07	.73	.03
10. I am very much involved personally with my work.	.08	.55	-.31

(Table VI cont.)

	<u>Factor</u>		
	1	2	3
11. I'm really a perfectionist about my work.	-.16	.28	-.30
12. Most things in life are more important than work.	-.05	-.30	.24
13. When I do my work well, it gives me a feeling of accomplishment.	.07	.03	-.75
14. When I perform my job well, it contributes to my personal growth and development.	.05	.13	-.70
15. I feel a great sense of personal satisfaction when I do my job well.	.10	.20	-.63
16. Doing my job well increases my feeling of self-esteem.	-.01	-.02	-.63

Table VII
Results of Cummings and Bigelow Factor Analysis of Sixteen Items

	Item	Factor		
		1	2	3
1.	The feeling of self-fulfillment a person gets from being in my position.	.78	.02	.11
2.	The opportunity, in my job, for participation in the setting of goals.	.68	.19	.13
3.	The opportunity, in my job, for participation in the determination of methods and procedures.	.83	-.01	.13
4.	The opportunity for independent thought and action in my position.	.78	-.03	.12
5.	The feeling of worthwhile accomplishment in my position.	.79	.09	.23
6.	The opportunities for personal growth and development in my position.	.74	.18	.24
7.	The major satisfaction in my life comes from my work.	.24	.76	.20
8.	The most important things that happen to me involve my job.	.01	.77	.12
9.	I live, eat, and breathe my job.	.01	.84	-.09
10.	I am very much involved personally in my work.	.16	.38	.52

(Table VII cont.)

Item	Factor		
	1	2	3
11. I'm really a perfectionist about my work.	-.02	.22	.45
12. Most things in life are more important than work.	.17	-.06	.18
13. When I do my work well, it gives me a feeling of accomplishment.	.15	.02	.84
14. When I perform my job well, it contributes to my personal growth and development.	.23	.08	.56
15. I feel a great sense of personal satisfaction when I do my job well.	.20	-.05	.81
16. Doing my job well increases my feeling of self-esteem.	.22	.04	.85

(Cummings and Bigelow, 1976:524)

ment, and intrinsic motivation can be developed that will apply across a wide variety of occupations and job types.

Summary

Based upon the previous work of Turner and Lawrence (1965) and Hackman and Lawler (1971), the job characteristics model developed by Hackman and Oldham (1975, 1976) appears to offer an appropriate vehicle for the analysis of the relationships between objective job characteristics, differences of individuals, and personal or work outcomes. In addition to the formulation of the job characteristics model, Hackman and Oldham (1975) developed a measurement tool, the JDS, which is capable of providing objective measures of job characteristics and growth need strength. Reliable and valid measures have also been developed for job satisfaction (Hoppock), job involvement (Lodahl and Kejner), and intrinsic motivation (Lawler). Finally, research has shown that the attitude factors of satisfaction, involvement, and intrinsic motivation can be uncorrelated, distinct factors.

III. Methodology

The purpose of this chapter is to provide a detailed description of the methods used in this thesis for the collection of the required data and of the techniques used for the analysis of that data. First, a discussion of the survey instrument is presented. Second, each of the groups that comprise the sample population is described. Next, the basic analysis plan is presented. Finally, the analytical techniques used to test the hypotheses listed in Chapter 1 are described.

The Survey Instrument

The primary focus of this study is an investigation of the moderating effects of organizational and individual differences on the relationships between objective job characteristics and the outcome variables of intrinsic motivation, job satisfaction, and job involvement. Since an appropriate survey instrument encompassing all of these variables did not exist, a composite survey instrument was constructed from various measures drawn from existing instruments. These measures can be divided into the six basic categories (1) demographic data, (2) job characteristics data, (3) intrinsic motivation data, (4) growth need data, (5) job satisfaction data, and (6) job

involvement data. The complete questionnaire may be found in Appendix A.

The demographic questions (Appendix A, Part I) included in this instrument were designed to facilitate analysis of the survey data based upon factors such as aeronautical rating, DAFSC, organizational membership, and job type. Consequently, in addition to questions generally common to all survey instruments, the demographic section of this instrument includes questions particularly related to the Air Force and the Systems Program Office environment.

The job characteristics questions were taken from the short form version of the JDS developed by Hackman and Oldham (1974). In each case, three questions were used to measure the five core dimensions of (1) autonomy (Appendix A, Questions III1, III11, III15), (2) task identity (Appendix A, Questions II2, III3, III13), (3) skill variety (Appendix A, Questions II3, III1, III7), (4) task significance (Appendix A, Questions II4, III10, III16), and (5) feedback from the job itself (Appendix A, Questions II6, III5, III14). The JDS also provided the six questions (Appendix A, Questions III2, III8, IV1, IV3, IV5, IV7) used to measure intrinsic motivation and the six questions (Appendix A, Questions V2, V3, V5, V7, V9, V10) used to measure growth need strength. The scoring procedures for each of these measures are presented in Appendix B.

Job satisfaction levels are measured with the Hoppock four-question (Appendix A, Questions VII1 to VII4) general job satisfaction measure (Hoppock, 1935). The format of these four questions differs from the Likert format used for the other measures. The job satisfaction questions are presented in a multiple-choice format with responses ranging from A to G. These alphabetic responses are later converted to numeric responses which then have the same response range of the Likert format (1 to 7). Scoring procedures for the Hoppock job satisfaction measure are presented in Appendix B.

The Sample Population

As mentioned previously, the sample population is comprised of military officer personnel (grade O-1 through O-5) assigned to several of the SPOs within the Aeronautical Systems Division at Wright-Patterson Air Force Base, Ohio. The eight SPOs included in the sample population are (1) the Deputy for Aeronautical Equipment (AE), (2) the Deputy for Engineering (EN), (3) the Deputy for Propulsion (YZ), (4) the Deputy for Strategic Systems (YY), (5) the Deputy for Systems (SD), (6) the Deputy for A-10 (YX), (7) the Deputy for F-15 (YF), and (8) the Deputy for F-16 (YP). A segment of the sample population was then eliminated since it was assumed an individual must work at a particular job for a minimum amount of time before being able to provide meaningful responses about that job. An

arbitrary time limit was established so that respondents with five months or less experience on their present jobs were eliminated from the sample population. A total of 872 questionnaires were distributed to the sample population. The individual response rate, the two SPO groups response rates (basket SPO group and super SPO group), and the overall response rate are presented in Table VIII.

The Analysis Plan

The first step in the analysis of the data was the examination of the measures of intrinsic motivation, job satisfaction, and job involvement for a lack of correlation between these measures. This was considered essential in order to make meaningful comparisons of these three factors across different organizational, occupational, and job-type groupings. Several previous studies of factorial correlation (Lawler and Hall, 1970; Cummings and Bigelow, 1976) used measures of satisfaction in the autonomy and self-actualization needs areas. Since this study effort used a more global measure, the Hoppock measure, comparisons of this correlation study with previous studies should recognize the possible difference of satisfaction measures. Principal component analysis with varimax rotation was used to investigate the uncorrelated nature of the outcome measures of intrinsic motivation, job satisfaction, and job involvement.

Table VIII
Questionnaire Response Rates

Organization	Number Distributed	Number Returned	Response Rate (Percent)	Number Greater Than Five Months	Usable Response Rate (Percent)
AE	141	96	68.1	67	47.5
EN	109	79	72.5	49	45.0
YZ	73	55	75.3	36	49.3
YY	108	77	71.3	59	54.6
SD	159	113	71.1	78	49.1
Basket Group Total	590	420	71.2	289	49.0
A-10	53	28	52.8	20	37.7
F-15	73	56	76.7	39	53.4
F-16	156	75	48.1	61	39.1
Syber Group Total	282	159	56.4	120	42.6
Overall Total	872	579	66.4	409	46.9

Second, correlation analysis was used to determine the relationships existing between the job characteristics and the outcomes of satisfaction, involvement, and intrinsic motivation. Correlation analysis was used to test hypothesis 1.

Next the z transform test was used to determine if the correlation coefficients of one group for specific variables were significantly different than the coefficients of another group. The z transform test was used to test hypotheses 2 and 3.

Finally, the two-sample ~~t~~ test was used to determine if the mean score of one group for a particular variable was significantly different from the mean score of another group. The two-sample t test was used to test hypotheses 4, 5, 6, 7, 8, and 9. With the exception of the z transform test, all analyses utilized programs of the Statistical Package for the Social Sciences (Nie, et al, 1975).

Analytical Techniques

Principal Component Analysis. Factor analysis is a statistical technique which examines a given set of variables to determine if an underlying pattern of relationships exists which will allow the data to be reduced to a smaller set of factors or components. Specifically, the data obtained from the 30 questions intended to measure involvement, intrinsic motivation, and satisfaction was factor

analyzed to determine if the particular questions associated with each measure actually described that measure. Ideally, this analysis would have identified one factor for each of the measures of involvement, intrinsic motivation, and satisfaction.

Factor analysis is normally accomplished in three steps. First, a correlation matrix is constructed in which each question is correlated with each of the other questions. Next, initial factors are extracted from the data. The first and most important factor, called the first principal component, represents the best linear combination of each of the variables which explains the maximum amount of the total variance in the data. The next factor represents the best linear combination which explains the maximum amount of the total variance in the data not explained by the first factor. This process continues until all the variance in the data is explained. There is normally one initial factor for each variable or question and each of these initial factors is associated with a particular eigenvalue. The eigenvalues represent the amount of total variance explained by each successive factor. These eigenvalues are examined to determine how many factors must be retained to adequately approximate the total variance in the data. This determination of the number of factors to be retained must be made before the third step of factor analysis, rotation, can be performed (McNichols, 1978).

Rotation of the factors is a process which rotates the coordinate system represented by the retained factors and provides alternative solutions which may be more easily interpreted. The two major types of rotation are (1) orthogonal (the factors are uncorrelated), and (2) oblique (the factors may be correlated). Although several rotational techniques are available in the SPSS program FACTOR (Nie, et al, 1975), orthogonal varimax rotation was selected for this study effort.

Correlation Analysis. One of the most frequently used techniques for determining the relationships existing between independent and dependent variables is correlation analysis. The type of correlation analysis used in this study is the Pearson Product-Moment correlation. These are called zero-order correlations because there are no controls made for the influence of other variables (Nie, et al, 1975). The Pearson correlation coefficient measures the strength of the relationship between two interval-level variables and the value of this coefficient ranges between -1 and 1. A value close to 0 indicates a weak relationship between the two variables; a value approaching 1 (-1) indicates a strong positive (negative) relationship between the two variables. A negative relationship means that the value of one of the paired variables changes inversely with the value of the other variable. It should be pointed out

that correlation analysis is used only to determine the degree of association between two variables, and not causality. The SPSS subroutine PEARSON CORR provided the correlation coefficient, the number of cases used in the calculations, and an associated level of significance based upon the Student's *t* distribution (Nie, et al, 1975).

The *z* Transform Test. One of the main goals of this study effort was to determine if differences in organizations or GNS produced significant differences in the relationship, or correlation, existing between job characteristics and outcomes. According to Fisher (1963:198-204), the *t* distribution is unsuited for comparisons of correlation coefficients and can be used only to test the null hypothesis $\rho = 0$ (zero correlation). Small samples do not produce very accurate values of *r* (the correlation coefficient) and the distribution of *r* is not normal for these small samples. Even in large samples, the distribution of *r* changes its form rapidly as ρ is changed. These effects can be seen in Figure 2.

The *z* distribution, on the other hand, is nearly constant in form and closely approximates a normal distribution regardless of the value of the correlation. Figure 3 shows the distribution of *z* for two different degrees of correlation.

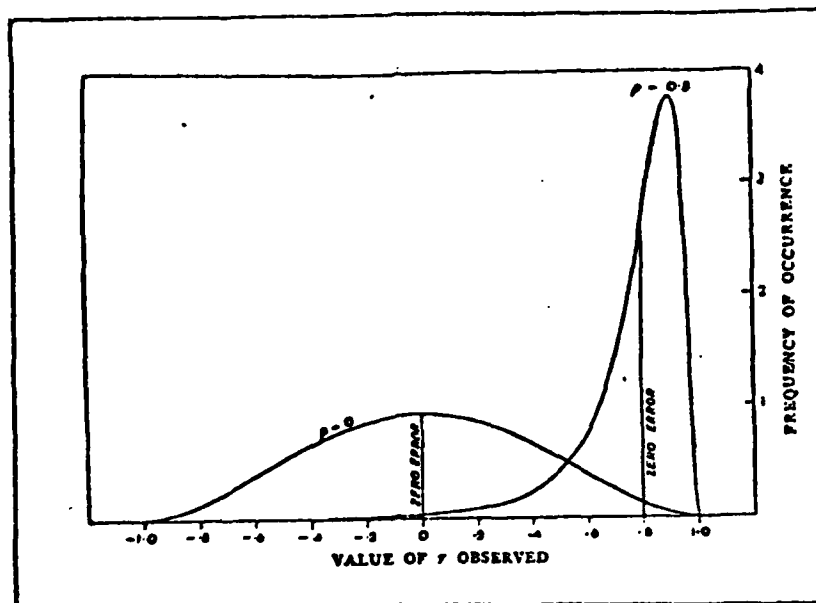


Figure 2. The Distribution of r for Different Degrees of Correlation (Fisher, 1963:200)

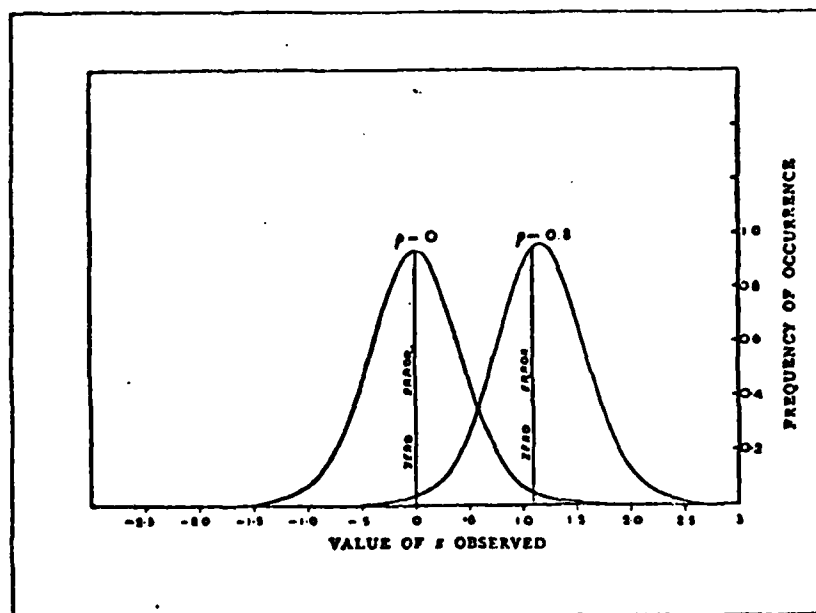


Figure 3. The Distribution of z for Different Degrees of Correlation (Fisher, 1963:200)

The relation of z to r is given by the following equation:

$$z = \frac{1}{2} [\log_e (1 + r) - \log_e (1 - r)]$$

The table shown in Appendix E can also be used to transform r to z .

The actual comparison of the two correlation coefficients is made as follows:

1. Each of the correlation coefficients to be compared is converted to a z value using the table in Appendix E.

2. The difference between the two z values is computed.

3. The standard error of the difference in z values is then computed according to the following equation:

$$\sigma_{z_1 - z_2} = \sqrt{\frac{1}{n_1 - 3} + \frac{1}{n_2 - 3}}$$

4. The ratio of the difference in z values to the standard error of the differences is computed and then compared to a z value corresponding to a selected significance level. The significance

level used in this thesis was .05 and this corresponds to a z value of 1.960 (one-tailed test).

5. If the computed z value is greater than the selected z value, the difference between the two correlation coefficients is significant at that selected level.

6. One-tailed tests are used in this study, since the study attempts to identify one correlation coefficient as significantly higher than another.

Two Sample t-Test. Another of the main goals of this study effort was to determine if various subgroups of the sample population displayed significantly different mean scores for various measures. The two sample t-test is designed to provide that determination on a statistical basis. The SPSS subroutine T-TEST performs one set of t-test calculations under the assumption that the two populations have equal variances, and another set of t-test calculations under the assumption that the two variances are unequal.

If the variances are assumed equal, the sample means and variances are calculated for the two groups and the pooled variance for these groups is computed. The t value corresponding to the difference in sample means and the probability associated with that t value is then calculated.

If this probability is less than the significance level chosen, the means for the two groups are considered to be significantly different.

If the variances are assumed unequal, the t value cannot be computed for the difference in sample means; however, it can be approximated with reasonable accuracy using different calculations for the t value and degrees of freedom.

If it is not known if the two populations have equal variances, an F test of the sample variances may be performed. If the F test is not significant, the variances are assumed equal and the pooled variance calculations can be used. If the F test is significant, the variances are assumed unequal and the separate variance approximations are used. This application of the F test will be used in this thesis to determine which of the two t -test calculations is appropriate for a particular measure.

IV. Results

The purpose of this chapter is to discuss the results of the analyses of the survey data. This discussion is presented in four sections and follows the analysis plan established in Chapter 3. The first section discusses the results of the factor analysis of the 30 questions designed to measure the outcomes of job satisfaction, job involvement, and intrinsic motivation. The second section discusses the relationship existing between the core job dimensions, the overall MPS, and the outcome measures identified in the factor analysis. The third section discusses the moderating effects of organizational differences and growth need strength on the relationship existing between the job dimensions, the overall MPS, and the outcome measures of job satisfaction, job involvement, and intrinsic motivation. The fourth section discusses the differences displayed by various subgroups of mean scores for job dimensions, overall MPS, and outcomes.

Factor Analysis

As mentioned previously, the purpose of the factor analysis was to determine if the particular questions designed to measure specific outcomes actually measured those outcomes. Ideally, the 30 questions used for these outcomes would be separated into 3 uncorrelated components, or factors, with

each of these factors describing a single outcome of satisfaction, involvement, or intrinsic motivation. If the 30 questions could not be reduced to 3 uncorrelated factors, the questions contributing to the correlations among the factors would be systematically removed until the remaining questions could be separated into 3 uncorrelated factors. The questions included in each of these factors would then represent uncorrelated measures of satisfaction, involvement, and intrinsic motivation and could then be used to make meaningful comparisons between various organizational, occupational, and job-type subgroups.

The 30 questions used in the initial factor analysis included 6 questions designed to measure intrinsic motivation (Appendix A, Questions III2, III8, IV1, IV3, IV5, IV7), 20 questions designed to measure involvement (Appendix A, Questions VII1 to VI20), and 4 questions designed to measure satisfaction (Appendix A, Questions VII1 to VII4). The results of this initial factor analysis (with varimax rotation) are presented in Table IX.

The initial factor analysis identified 7 factors with eigenvalues greater than 1.0 and this solution explained 58.7 percent of the total variance. The questions with the highest loadings on factor 1 were III2, IV3, VI4, VII3, VII1, VII2, VII3, and VII4. Of these questions, III2 and IV3 were designed to measure intrinsic motivation, VI4 and VII3 were designed to measure involvement, and VII1 through

Table IX
Results of Initial Factor Analysis

Question	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
III2	.71529	.09603	.09237	-.00546	.07246	.05427	-.07447
III8	.10651	-.03566	.59864	-.14185	-.05404	.05932	.03742
IV1	.45552*	.18003	.52309	-.14373	.06623	-.02741	-.02929
IV3	.69355	.10172	.40972*	.07612	.14079	.00722	-.03518
IV5	-.10401	.01691	.57939	.30315	-.03251	.10269	.07248
IV7	.31121	.05078	.57094	.16828	.29835	.00003	.14600
VI1	.20887	.09187	.18009	.21037	.47089	.29922	.15674
VI2	.13084	.15776	.34512	-.01388	-.07195	.56980	-.03494
VI3	.16175	.75599	.08185	-.02533	.16283	.23361	.05894
VI4	.52143	.19736	.16570	.11345	.29359	.21108	-.00707
VI5	.16084	.13028	-.07931	.10749	.17014	.64244	-.05021
VI6	.21197	.78640	.06215	-.07407	.03794	.29751	.06516
VI7	.09343	.16570	.03213	.06247	.08048	.31327	.60444
VI8	.05954	.08388	.11926	.09903	.04948	.58816	.29478
VI9	-.09681	.13788	.56144	.06084	.12657	.20461	.43423*
VI10	.16364	.69586	.00326	.19890	-.00705	-.07539	.18803
VI11	.13188	.51761	-.03664	-.20721	.21114	.23184	.31752
VI12	.11306	.10572	-.03023	-.03752	.77455	.00133	.05754
VI13	.42206	.09939	-.07183	.13178	.40984*	.16798	-.16992

(Table IX cont.)

Question	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
VI14	.09728	.66729	.08414	.33448	.08325	.01741	-.05468
VI15	.37217	.23779	.20266	.10924	.43647	.32374	.27176
VI16	.14169	-.00215	.15617	.52265	.38331	.04442	-.01368
VI17	.41058*	.05113	-.05978	.68466	.01276	.18886	.01250
VI18	.15743	.40167*	.03675	.46841	.42438*	-.13049	.06384
VI19	.35701	.14052	.02714	.68472	-.03603	.11012	-.01023
VI20	.06585	.07735	.15297	-.04953	.00688	-.10274	.72990
VII1	.84349	.15206	.04119	.19173	.10384	.06290	.15503
VII2	.74579	.07359	-.06173	.19130	.07221	.05008	.16408
VII3	.76048	.16962	.04129	.25508	.11954	.11523	.16774
VII4	.81937	.15155	.02593	.22602	.07484	.17312	.01887

Notes:

a. n = 397

b. * indicates loading on additional factor greater than 0.40.

VII4 were designed to measure satisfaction. Since all four of the questions intended to measure satisfaction are grouped together on the first factor and have relatively high factor loadings, this factor could be interpreted as a job satisfaction factor. This interpretation is supported by an examination of the wording of the remaining four questions identified for the first factor. In particular, questions III2 and IV3 are expressed in terms of personal satisfaction. Given that six of the eight questions involve satisfaction, it seems reasonable to identify this first factor as a job satisfaction factor.

The questions loading highest on factor 2 were VI3, VI6, VII0, VII1, and VII4. Since each of these questions were designed to measure job involvement and the factor loadings are approximately equal in magnitude, this second factor could be identified as a job involvement factor. This interpretation is supported since none of the questions designed to measure satisfaction or intrinsic motivation load significantly on this second factor.

The questions loading highest on factor 3 were III8, IV1, IV5, IV7, and VI9. Since all of the questions except VI9 were designed to measure intrinsic motivation, this factor would tend to be interpreted as an intrinsic motivation question. Question VI9 was designed to measure job involvement and although the wording does not lead to a clean inter-

pretation in terms of intrinsic motivation, question VI9 does not load heavily on any of the factors of satisfaction or involvement. Given these results, it appears reasonable to interpret the third factor as an intrinsic motivation factor.

The questions loading highest on factor 4 were VI6, VI7, VI8, and VI9. Since each of these questions were designed to measure job involvement and the factor loadings are approximately equal, this fourth factor could be identified as another job involvement factor. This interpretation is supported because none of the questions designed to measure satisfaction or intrinsic motivation load significantly on factor 4. Also, the only question in this group (VI18) which loads on additional factors does so only with other involvement factors and not with satisfaction or intrinsic motivation.

The questions loading highest on factor 5 were VII, VII2 and VII5. Each of these questions was designed to measure job involvement and loads significantly only on the fifth factor. Also, none of the questions designed to measure satisfaction or intrinsic motivation load significantly on this fifth factor. Given these results, it appears reasonable to interpret the fifth factor as another job involvement factor.

The questions loading highest on factor 6 were VI2, VI5, and VI8. Since these questions were all designed to measure job involvement, have approximately the same factor

loadings, and do not load on additional factors, this sixth factor could be interpreted as an additional factor of job involvement. This interpretation is further supported since none of the questions designed to measure job satisfaction or intrinsic motivation load significantly on this sixth factor.

The questions loading highest on factor 7 were VI7 and VI20. These two questions were designed to measure job involvement and load only on the seventh factor. None of the questions designed to measure satisfaction or intrinsic motivation load significantly on this seventh factor. Given these results, it appears reasonable to interpret this seventh factor as another involvement factor.

In summary, then, the initial factor analysis identified seven underlying factors or components. Based upon the interpretations described above, the six question designed to measure intrinsic motivation appear to measure both intrinsic motivation (factor 3) and job satisfaction (factor 1). The four questions designed to measure job satisfaction appear to measure only job satisfaction (factor 1). The twenty questions designed to measure intrinsic motivation appear to measure intrinsic motivation (factor 3), job satisfaction (factor 1), and five different dimensions of job involvement (factors 2, 4, 5, 6, and 7).

Since this initial factor analysis indicated that certain questions designed to measure outcomes did not measure only those outcomes, additional factor analyses were performed in an effort to eliminate those questions from the particular measures. In this way, it was hoped to develop measures of outcomes whose component questions described only their particular measures.

Because the four job satisfaction questions were all grouped on the factor identified as job satisfaction and did not load on any of the other factors in the initial analysis, these four questions were retained intact as the measure of job satisfaction.

Since the six questions designed to measure intrinsic motivation appeared to measure both intrinsic motivation and job satisfaction, a factor analysis on just these six questions was performed. This was accomplished in order to determine if the six questions (as an individual measure) by themselves still appeared to measure something more than a single dimension of intrinsic motivation. This analysis produced a two-factor solution which explained 59.7 percent of the variance of the questions. The results are presented in Appendix C and indicate that the six questions appear to describe the two factors of satisfaction (factor 1) and intrinsic motivation (factor 2). Since two of the six questions (III2 and IV3) were expressed in terms of personal

satisfaction; these two questions were then removed. The remaining four questions (III8, IV1, IV5, and IV7) were retained as a measure of intrinsic motivation.

The initial factor analysis also indicated that the 20 question designed to measure involvement actually appeared to describe job satisfaction, intrinsic motivation, and 5 dimensions, or facets of job involvement. In an effort to obtain a single measure of job involvement, factor analysis was performed on the 20 job involvement questions taken as a separate group. This factor analysis produced a five-factor solution which explained 54.7 percent of the total variance in those 20 questions. The results of this analysis are presented in Appendix C. Since the first principal component (factor) accounted for approximately half of the total variance of the five-factor solution, the 13 questions (VII1, VI2, VI3, VI4, VI6, VI7, VI8, VII0, VII1, VII3, VII4, VII5, and VII8) loading highest on this factor were believed to represent the best single measure of involvement. These 13 questions were then retained as the measure of job involvement.

The 13 job involvement questions were grouped with the 4 job satisfaction questions and the 4 intrinsic motivation questions (retained from the factor analysis of only the intrinsic motivation questions). A factor analysis was then performed for these 21 questions. The results of this

analysis indicated that certain of the job involvement questions still either described job satisfaction, intrinsic motivation, or more than one dimension of job involvement. The involvement questions which described job satisfaction and intrinsic motivation, or those responsible for dimensions of involvement considered sub-dimensions (for example, a factor with only a single involvement question loading on it) were eliminated and a subsequent factor analysis performed.

This procedure produced a three-factor solution which explained 60.2 percent of the total variance of the questions involved. The results of this factor analysis are presented in Table X.

Factor 1 includes only the four retained job satisfaction questions (VIII1 through VII4) and is interpreted as a job satisfaction factor. Factor 2 included only five job involvement questions (VI3, VI6, VII0, VII1, and VII4) and is interpreted as a job involvement factor. Factor 3 included only the four retained intrinsic motivation questions (III8, IV1, IV5, and IV7) and is interpreted as an intrinsic motivation factor. Since the factor loadings within each factor were approximately the same magnitude, it was considered reasonable to apply equal weighting to each of the component questions when developing measures for satisfaction, involvement, and intrinsic motivation. For

Table X
Results of Revised Measure Factor Analysis
With Varimax Rotation

<u>Question</u>	<u>Factor 1</u>	<u>Factor 2</u>	<u>Factor 3</u>
III8	-.02240	-.01107	.69191
IV1	.35724	.16183	.47742
IV5	-.06343	.04751	.70873
IV7	.35302	.08653	.66849
VI3	.13564	.82191	.05399
VI6	.16211	.84002	.05106
VII0	.17639	.67743	.01114
VII1	.08113	.63950	.04889
VII4	.16368	.62926	.09227
VIII1	.88007	.21114	.10520
VII2	.84065	.10839	.01311
VII3	.84816	.23562	.10448
VII4	.85273	.20251	.10021

n = 339

example, the measure of job satisfaction was formed by averaging the responses to questions VIII1, VII2, VII3, and VII4. An alternative procedure could have been used in which the factor score coefficients shown in Table XI are used to form the outcome measure. This procedure uses each of the factor score coefficients in a particular factor column to

compute the score for that measure. For example, the score for job satisfaction would be computed as follows:

$$\text{JOB SAT} = \frac{(\text{III8} - \overline{\text{III8}})(-.08416)}{\text{SD}_{\text{III8}}} + \dots + \frac{(\text{VII4} - \overline{\text{VII4}})(.28579)}{\text{SD}_{\text{VII4}}}$$

Table XI
Factor Score Coefficients

<u>Variable</u>	<u>Satisfaction Factor 1</u>	<u>Involvement Factor 2</u>	<u>Intrinsic Motivation Factor 3</u>
III8	-.08416	-.03173	.44622
IV1	.05922	-.00696	.25882
IV5	-.11088	-.00107	.45899
IV7	.04790	-.04693	.38501
VI3	-.08076	.32830	-.01673
VI6	-.07304	.33208	-.02237
VII0	-.03797	.26208	-.04237
VII1	-.07300	.25890	-.00588
VII4	-.04449	.23986	.01314
VIII1	.29422	-.05024	-.04015
VII2	.30540	-.08405	-.09023
VII3	.27844	-.03480	-.03813
VII4	.28579	-.04949	-.03992
n = 399			

Note that for this particular factor analysis, each score would be formed by a total of 13 component scores (one for each of the 13 questions), with one column of factor score coefficients used for each measure.

To determine if the two methods produced different scores, several cases were selected at random and scores computed for each method. Upon comparison, the two methods did not produce significantly different scores, and the simple average method was used for this thesis.

Since the revised measures were to be compared across various subgroupings, factor analysis was performed with these measures for several of those subgroupings. These analyses were performed in order to evaluate the consistency of the measures across subgroups such as the super SPO group, the basket SPO group, and groups formed according to GNS. The results of these analyses are presented in Appendix D. The factor analysis for the basket SPO group ($n = 282$) produced a three-factor solution which explained 59.4 percent of the variance and which had the same question groupings per factor as the overall analysis. The factor analysis for the super SPO group ($n = 117$) produced a three-factor solution with the same question groups which explained 62.1 percent of the variance. Factor analysis for the group of 140 individuals with low GNS scores (lower one-third of GNS scores) produced a three-factor solution with the same question groups which explained 58.2 percent of the variance.

Finally, factor analysis for the group of 120 individuals with high GNS scores (upper one-third of GNS scores) produced a three-factor solution with the same question groups which explained 60.5 percent of the variance.

Based upon these results, the measures developed for job satisfaction, job involvement, and intrinsic motivation, were judged to be uncorrelated measures that applied consistently across subgroups of the sample population. Consequently, these revised measures were used during the remainder of the data analyses in this thesis.

Correlation Analysis

As mentioned previously, the purpose of the correlation analysis used in this study effort was the determination of the relationship existing between the job characteristics and the outcomes of satisfaction, involvement, and intrinsic motivation. The hypothesis tested in this section was:

Hypothesis 1: There is a positive relationship existing between the five core job dimensions and the outcomes of job satisfaction, job involvement, and intrinsic motivation.

Table XII presents the zero-order correlation coefficients for the variables considered in the first hypothesis.

It can be seen from these coefficients that job satisfaction is significantly correlated at the .001 level with skill variety, task identity, task significance, autonomy,

feedback, and the overall MPS. The overall MPS provides the highest correlation with job satisfaction. The second highest correlation is provided by skill variety and the lowest correlation is provided by task identity.

Job involvement is also significantly correlated at the .001 level with the core job dimensions, although the coefficients are generally smaller than those for job satisfaction or intrinsic motivation. Task significance provides the highest correlation with job involvement. The second highest correlation is provided by skill variety and the lowest correlation is provided by task identity.

The third outcome, intrinsic motivation, is also significantly correlated with the core job dimensions at the .001 level. These coefficients are generally higher than those for job involvement, and lower than those for job satisfaction. Task significance provides the highest correlation with intrinsic motivation and skill variety provides the second highest correlation. The lowest correlation is provided by task identity.

It is interesting to note that skill variety provided the second highest correlation with each of the three outcomes, while task identity provided the lowest correlations with each of the three outcomes.

The results of the correlation analysis provide substantial support for the first hypothesis: a significant

Table XII
Correlations Between the Core Job Dimensions and Outcomes

<u>VARIABLES</u>	<u>n</u>	<u>r</u>
JOB SATISFACTION and:	399	
1. SKILL VARIETY		.624
2. TASK IDENTITY		.457
3. TASK SIGNIFICANCE		.539
4. AUTONOMY		.573
5. FEEDBACK		.567
6. MPS		.660
JOB INVOLVEMENT and:	402	
1. SKILL VARIETY		.287
2. TASK IDENTITY		.168
3. TASK SIGNIFICANCE		.301
4. AUTONOMY		.178
5. FEEDBACK		.224
6. MPS		.264
INTRINSIC MOTIVATION and:	403	
1. SKILL VARIETY		.354
2. TASK IDENTITY		.203
3. TASK SIGNIFICANCE		.375
4. AUTONOMY		.322
5. FEEDBACK		.302
6. MPS		.351

Notes:

a. Number of cases differs because of listwise deletion, in which the entire case is removed from the calculations if there is missing data for any of the seven variables used in each correlation.

b. All correlations are significant at the .001 level, two-tailed test.

positive relationship exists between the five core job dimensions and the outcomes of job satisfaction, job involvement, and intrinsic motivation.

Z Test for Differences Between Correlation Coefficients

The purpose of the analysis presented in this section was the determination of the moderating effects of organizational differences and growth need strength on the relationship existing between the job dimensions and the outcomes. The Z transform test was used for these analyses to test for differences between correlation coefficients of various subgroups. The hypotheses tested in this section were:

Hypothesis 2: Organizational differences moderate the relationship between the job dimensions and the outcomes.

Hypothesis 3: Growth need strength moderates the relationship between the job dimensions and the outcomes.

Table XIII presents the results of the Z transform test for the basket SPO group compared to the super SPO group.

In order for the second hypothesis to be supported, significant differences should exist between the correlation coefficients of the two groups. As can be seen from Table XIII, general support is not provided for hypothesis 2. None of the differences between coefficients are significant at the .05 level, and only two (task significance with job satisfaction and task identity with job involvement) are

Table XIII
Z Transform Test for Differences Between
Correlations Basket SPO and Super SPO

<u>Variables</u>	<u>r₁</u> <u>(Basket)</u>	<u>r₂</u> <u>(Super)</u>	<u>n₁/n₂</u>	<u>Differences</u>
JOB SATISFACTION and:				
1. SKILL VARIETY	.609	.682	282/117	1.135
2. TASK IDENTITY	.461	.437		.270
3. TASK SIGNIFICANCE	.561	.422		1.667*
4. AUTONOMY	.574	.563		.144
5. FEEDBACK	.563	.558		.072
6. MPS	.658	.656		.009
JOB INVOLVEMENT and:				
1. SKILL VARIETY	.289	.279	284/118	.090
2. TASK IDENTITY	.215	.032		1.685*
3. TASK SIGNIFICANCE	.272	.304		.315
4. AUTONOMY	.216	.064		1.405+
5. FEEDBACK	.234	.147		.811
6. MPS	.289	.161		1.225
INTRINSIC MOTIVATION and:				
1. SKILL VARIETY	.323	.417	286/117	.982
2. TASK IDENTITY	.246	.084		1.505+
3. TASK SIGNIFICANCE	.403	.283		1.234
4. AUTONOMY	.342	.262		.793
5. FEEDBACK	.343	.190		1.486+
6. MPS	.378	.278		1.009
*Significance at the .100 level.				
+Significance at the .200 level.				

significant at the .10 level. Even if the significance level is extended to .20, only three of the remaining thirteen differences are significant (autonomy with job involvement, task identity with intrinsic motivation, and feedback with intrinsic motivation). Based upon these results, the second hypothesis should be rejected: organizational differences expressed by the two groups of basket SPO and super SPO do not significantly moderate the relationship between the job dimensions and the outcomes.

Table XIV presents the results of the Z transform test for the high GNS group (upper one-third) and the low GNS group (lower one-third).

In order for hypothesis 3 to be supported, significant differences should exist between the correlation coefficients of the two groups. Also, the job characteristics model (Hackman and Oldham, 1976), upon which much of this study effort is based, proposes that these differences should be significant in the direction of increasing growth need strength. That is, the higher growth need strength group should have higher correlation coefficients than the lower group. As seen by Table XIV, general support is not provided for hypothesis 3. None of the differences between coefficients are significant at the .05 level, and only two (overall MPS with job satisfaction, and task significance with job involvement) are significant at the .10 level. Also, the difference of correlations for task significance

Table XIV
Z Transform Test for Difference Between Correlations
High GNS and Low GNS

<u>Variables</u>	<u>r₁</u> <u>(High)</u>	<u>r₂</u> <u>(Low)</u>	<u>n₁/n₂</u>	<u>\bar{z} for</u> <u>Differences</u>
JOB SATISFACTION and:				
1. SKILL VARIETY	.656	.554	122/137	1.013
2. TASK IDENTITY	.476	.487		.111
3. TASK SIGNIFICANCE	.587	.546		.484
4. AUTONOMY	.636	.514		1.452+
5. FEEDBACK	.619	.523		1.135
6. MPS	.717	.596		1.706*
JOB INVOLVEMENT and:				
1. SKILL VARIETY	.130	.317	122/140	1.584+
2. TASK IDENTITY	.126	.136		.080
3. TASK SIGNIFICANCE	.183	.379		1.712* (Neg)
4. AUTONOMY	.129	.100		.240
5. FEEDBACK	.161	.165		.040
6. MPS	.189	.218		.248
INTRINSIC MOTIVATION and:				
1. SKILL VARIETY	.338	.279	122/140	.520
2. TASK IDENTITY	.058	.153		.768
3. TASK SIGNIFICANCE	.317	.277		.352
4. AUTONOMY	.176	.284		.912
5. FEEDBACK	.218	.224		.048
6. MPS	.212	.300		.760
*Significant at the .100 level.				
+Significant at the .200 level.				

with job involvement is in the direction opposite to the expectations of the job characteristics model: the low growth need strength has a significantly (at the .10 level) higher correlation coefficient than the high group. If the significance level is extended to the .20 level, only 2 of the remaining 13 differences are significant (autonomy with job satisfaction, and skill variety with job involvement). Based upon these results, the third hypothesis should be rejected: growth need strength does not significantly moderate the relationship between the job dimensions and the outcomes.

T Test for Differences Between Mean Scores

The purpose of the analyses presented in this section was the determination of significant differences between mean scores for various subgroups of the sample population. The two-sample t test was used for these analyses to test for significant differences between mean scores of job characteristics, MPS, and outcomes. The hypotheses tested in this section were:

- Hypothesis 4: The basket SPO group has a higher overall MPS than the super SPO group.
- Hypothesis 5: The basket SPO group is more job satisfied, job involved, and intrinsically motivated than the super SPO group.

Hypothesis 6: Pilots are more job satisfied, job involved, and intrinsically motivated than either navigators or nonrated personnel in the same group.

Hypothesis 7: Navigators in the basket SPO group are more job satisfied, job involved, and intrinsically motivated than either pilots or nonrated personnel in the same group.

Hypothesis 8: Program managers (27XX DAFSC) are more job satisfied, job involved, and intrinsically motivated than other types of specialty codes.

Hypothesis 9: Individuals with higher growth need strengths have higher mean scores on the measures of core job dimensions, overall MPS, and outcomes than individuals with lower growth need strengths.

Table XV presents the results of the t test for MPS scores of the basket SPO compared to the super SPO group. One-tailed probabilities are shown for this table, as well as the other tables in this section, because each of the hypotheses tested in this section are expressed in terms of one group displaying higher mean scores than another group. Also, a significance level of .05 is used for all the comparisons of significance in this section. In order for hypothesis 4 to be supported, the mean MPS score for the basket SPO group should be significantly higher than the MPS score for

Table XV
T Test for Basket SPO Group Compared to Super SPO Group

Group 1: Basket SPO Group 2: Super SPO		<u>Pooled Variance</u>				<u>Separate Variance</u>			
<u>Variable</u>	<u>Group/N</u>	<u>Mean</u>	<u>SD</u>	<u>F</u>	<u>2-Tail Prob</u>	<u>t</u>	<u>DOF</u>	<u>1-Tail Prob</u>	<u>1-Tail Prob</u>
MPS	1/286	142.578	76.202	1.12	.456	-2.48	402	.007	.008
	2/118	163.649	80.580						
JOB SAT	1/283	4.774	1.085	1.35	.661	-2.54	399	.006	.004
	2/118	5.064	.933						
JOB INV	1/285	2.898	1.193	1.19	.253	-3.53	402	.000	.001
	2/119	3.370	1.300						
INT MOT	1/287	5.612	.833	1.23	.164	- .98	403	.165	.176
	2/118	5.710	.981						

the super SPO group. As seen in Table XV, the two-tailed probability for the F test is .456 and exceeds the significance level of .05. Consequently, the variance of the two samples can be considered equal and the value for t and its probability is taken from the pooled variance section of the table. The one-tailed probability from this column is .007 and is less than the significance level of .05. Thus, the two mean scores are significantly different at the .05 level. However, the negative value of t (-2.48) implies either that the sample is extremely unusual or the original set of hypotheses is wrong (Nie, et al, 1975:271). If the alternative hypothesis is changed to predict that the mean MPS score for the basket SPO group is less than the mean MPS score for the super SPO group, the value of t would be negative. Based upon these results, the fourth hypothesis should be rejected; the mean MPS score for the basket SPO group is not significantly greater than the mean MPS score for the super SPO group. In fact, the results support an alternative hypothesis that the mean MPS score for the basket SPO is significantly less than that of the super SPO group.

Table XV also presents the results of the t test for the outcomes of satisfaction, involvement, and intrinsic motivation of the basket SPO group compared to the super SPO group. In order for hypothesis 5 to be supported, the mean outcome scores for the basket SPO group should be significantly higher than the mean outcome scores for the super SPO group.

Since the two-tailed probability of the F test is greater than the significance level of .05 for each of the three outcomes, the variances of the samples are considered equal and the t values with their associated one-tailed probabilities are drawn from the pooled variance section of the table. For job satisfaction, the one-tailed probability of .006 and the negative t value of -2.54 imply that the mean score for the basket SPO group is not significantly greater, but in fact, significantly less than that of the super SPO group. For job involvement, the one-tailed probability of .000 and the negative t value of -3.53 imply that the mean score for the basket SPO is significantly less, not greater, than that of the super SPO group. For intrinsic motivation, the one-tailed probability of .165 is greater than the significance level of .05 and the t value is -.98. This implies that the mean score for the basket SPO is less, not greater, than that for the super SPO group, but the difference is not significant. Based upon these results, the fifth hypothesis should be rejected: the basket SPO group is not more job satisfied, job involved, and intrinsically motivated than the super SPO group. Strong support is instead provided for the alternative hypothesis that the super SPO group is significantly more job satisfied and job involved than the basket SPO group.

Table XVI presents the results of the t test for pilots, navigators, and nonrated personnel within the super SPO group.

Table XVI

T Test for Pilots Compared to Navigators and Nonrated Personnel
Super SPO Group Only

Variable	Group/N	Mean	SD	F	2-Tail			Pooled Variance			Separate Variance		
					Prob			t	DOF	1-Tail Prob	t	DOF	1-Tail Prob
JOB SAT	1/29 2/08	5.103 5.188	1.043 .609	2.93	.144			-.22	35	.415	-.29	20	.388
JOB INV	1/29 2/08	3.538 3.625	1.285 1.480	1.35	.528			-.16	35	.435	-.15	10	.442
INT MOT	1/29 2/07	5.586 5.679	1.111 .886	1.57	.601			-.20	34	.419	-.23	11	.409
JOB SAT	1/29 3/80	5.103 5.025	1.043 .925	1.27	.406			.38	107	.353	.36	45	.361
JOB INV	1/29 3/81	3.538 3.279	1.285 1.301	1.02	.977			.92	108	.179	.93	50	.179
INT MOT	1/29 3/80	5.586 5.763	1.111 .950	1.37	.285			-.82	107	.208	-.76	44	.226
JOB SAT	1/29 4/88	5.103 5.040	1.043 .899	1.34	.301			.32	115	.375	.29	43	.385
JOB INV	1/29 4/89	3.538 3.310	1.285 1.314	1.05	.929			.82	116	.208	.82	49	.207
INT MOT	1/29 4/87	5.586 5.756	1.111 .941	1.39	.248			-.80	114	.212	-.74	42	.232

In order for hypothesis 6 to be supported, the mean outcome scores for pilots should be significantly higher than those for either navigators or nonrated personnel within the super SPO group. Since all of the two-tailed probabilities associated with the F tests are greater than the .05 significance level, the sample variances are considered equal and the t values with their associated one-tailed probabilities are drawn from the pooled variance section of the table. Since none of the mean score differences for any of the outcomes are significant at the .05 level, the sixth hypothesis should be rejected: pilots in the super SPO group are not more job satisfied, job involved, or intrinsically motivated than nonpilots in the same SPO group.

Table XVII presents the results of the t test for pilots, navigators, and nonrated personnel within the basket SPO group.

Hypothesis 7 receives partial support since navigators in the basket SPO are significantly more job involved (.032 level) and intrinsically motivated (.052 level) than pilots in the same group. Navigators are also significantly more intrinsically motivated (.038 level) than nonrated personnel in the same group. When compared against pilots and nonrated personnel as a single group, navigators are more job involved (.054 level) and intrinsically motivated (.034 level) than this composite group. Based upon the F test, all t values

Table XVII

T Test for Navigators Compared to Pilots and Nonrated Personnel
Basket SPO Group Only

Variable	Group/N	Mean	SD	F	2-Tail Prob	Pooled Variance			Separate Variance		
						t	DOF	1-Tail Prob	t	DOF	1-Tail Prob
JOB SAT	1/33 2/49	4.917 4.602	1.137 1.215	1.14	.698	1.18	80	.121	1.20	72	.118
JOB INV	1/34 2/48	3.206 2.704	1.238 1.165	1.13	.693	1.87	80	.032	1.85	69	.034
INT MOT	1/34 2/49	5.868 5.566	.817 .827	1.03	.954	1.64	81	.052	1.64	72	.052
JOB SAT	1/33 3/201	4.917 4.792	1.137 1.043	1.19	.473	.63	232	.265	.59	42	.279
JOB INV	1/34 3/203	3.206 2.893	1.238 1.187	1.09	.703	1.42	235	.079	1.37	44	.088
INT MOT	1/34 3/203	5.868 5.575	.817 .902	1.22	.511	1.77	235	.038	1.90	48	.031
JOB SAT	1/33 4/250	4.917 4.755	1.137 1.079	1.11	.641	.80	281	.211	.77	40	.222
JOB INV	1/34 4/251	3.206 2.857	1.238 1.183	1.10	.677	1.61	283	.054	1.55	42	.064
INT MOT	1/34 4/252	5.868 5.573	.817 .886	1.18	.591	1.83	284	.034	1.95	44	.028

and associated one-tailed probabilities were drawn from the pooled variance section of the table. Given the results of Table XVII, the seventh hypothesis should be partially accepted: navigators in the basket SPO group are significantly more job involved and intrinsically motivated than pilots or pilots and nonrated together in the same group, and significantly more intrinsically motivated than nonrated personnel in the same group. Navigators in the basket SPO group are not more job satisfied than pilots, nonrated personnel, or pilots and nonrated personnel together in the same group.

Table XVIII presents the results of the t test for program managers (27XX), scientists (26XX), engineers (28XX), and other job types.

Hypothesis 8 receives very little support since program managers are more job satisfied (.52 level) than other job types only when all of the other job types are considered as a single group. When compared against individual job types, program managers do not have higher mean scores on the outcome measures. All t values and associated probabilities are drawn from the pooled variance section of the table. Based upon these results, hypothesis 8 should be substantially rejected: when compared against individual job types, program managers are not more job satisfied, job involved, or intrinsically motivated. When compared against the other job types as a whole, program managers are more job satisfied but not more job involved or intrinsically motivated.

T Test for Program Managers Compared to Other Job Types

27XX-Program Managers 26XX-Scientists 28XX-Engineers All Other Job Types Than 27XX											
Variable	Group/N	Mean	SD	F	2-Tail Prob	Pooled Variance			Separate Variance		
						t	DOF	1-Tail Prob	t	DOF	1-Tail Prob
JOB SAT	2/183 1/15	4.952 4.950	1.003 1.303	1.69	.123	.01	196	.497	.01	15	.497
JOB INV	2/183 1/15	3.035 2.667	1.257 1.434	1.30	.421	1.08	196	.142	.97	16	.175
INT MOT	2/183 1/15	5.671 5.583	.911 .754	1.45	.426	.36	196	.359	.42	18	.338
JOB SAT	2/183 3/113	4.952 4.774	1.003 1.083	1.16	.363	1.44	294	.076	1.41	224	.078
JOB INV	2/183 3/116	3.035 3.007	1.257 1.182	1.13	.475	.19	297	.423	.20	256	.422
INT MOT	2/183 3/115	5.671 5.528	.911 .954	1.10	.570	1.29	296	.099	1.28	234	.101
JOB SAT	2/183 4/218	4.952 4.781	1.003 1.083	1.16	.289	1.63	399	.052	1.64	395	.050
JOB INV	2/183 4/221	3.035 3.039	1.257 1.234	1.04	.787	-.03	402	.488	-.03	385	.488
INT MOT	2/183 4/220	5.671 5.615	.911 .914	1.01	.965	.61	401	.270	.61	388	.270

Table XIX presents the results of the t test of the high GNS group compared to the low GNS group for measures of core dimensions, overall MPS, and outcomes.

Hypothesis 9 receives very strong support since the high GNS group displays significantly higher mean scores for all the measures except job involvement. Based upon the F test results, t values and probabilities drawn from the pooled variance section were used for task significance, autonomy, and intrinsic motivation. The remaining measures assumed unequal variances between samples (F test probability less than .05) and used t values and associated probabilities from the separate variance section of the table. Based upon the results of Table XIX, hypothesis 9 should be accepted: with the exception of job involvement, the high GNS group displays higher mean scores for the job dimensions, overall MPS, and outcomes.

Table XIX
T Test for High GNS Group Compared to Low GNS Group

Variable	Group/N	Mean	SD	F	2-Tail Prob	Pooled Variance			Separate Variance		
						t	DOF	1-Tail Prob	t	DOF	1-Tail Prob
SKILL VARIETY	1/123 2/142	5.569 5.282	1.364 1.071	1.62	.006	1.92	263	.028	1.89	230	.030*
TASK IDENTITY	1/123 2/142	4.748 4.298	1.629 1.309	1.55	.012	2.49	263	.006	2.45	233	.007*
TASK SIGNIF	1/123 2/141	5.580 5.097	1.452 1.368	1.13	.495	2.78	262	.003*	2.77	252	.003
AUTONOMY	1/123 2/142	5.615 5.237	1.346 1.182	1.30	.136	2.43	263	.008*	2.41	245	.008
FEEDBACK	1/123 2/141	4.940 4.541	1.515 1.219	1.55	.013	2.37	262	.009	2.34	234	.010*
MPS	1/123 2/140	163.750 124.577	90.457 60.875	2.21	.000	4.16	261	.000	4.06	209	.00*
JOB SAT	1/122 2/139	4.978 4.659	1.140 .905	1.59	.009	2.52	259	.006	2.48	230	.007*
JOB INV	1/122 2/142	3.079 2.975	1.322 1.134	1.36	.079	.69	262	.246*	.68	240	.248
INT MOT	1/122 2/142	5.850 5.373	.871 .802	1.18	.344	4.63	262	.000*	4.61	248	.000

*Indicates the one-tailed probability used to determine significance.

V. Conclusions and Recommendations

The purpose of this chapter is to summarize the results of the analyses performed in this thesis and to make recommendations based upon those results. The factor analysis of the outcome measures is discussed first. The results of the hypothesis testing is then presented. Finally, some recommendations concerning the results of the data analysis are presented.

Factor Analysis of Outcome Measures

The primary purpose of the factor analysis was to determine if the questions designed to measure the outcomes of satisfaction, involvement, and intrinsic motivation actually measured those outcomes orthogonally. If correlations did exist between the three measures, the questions responsible for these correlations would be removed and additional factor analyses performed until these outcomes were orthogonal. This procedure identified three orthogonal factors identified as satisfaction, involvement, and intrinsic motivation. This three-factor solution explained 60.2 percent of the variance of the questions used to describe the outcomes. To investigate the consistency of the outcome measures, the sample population was divided into various subgroups and factor analysis performed. In each case, three-factor solutions were produced with identical question groups per factor.

Variance explained by these solutions ranged from 58.2 percent to 62.1 percent. Based upon these results, it was concluded that orthogonal, consistent measures were developed for the outcomes of satisfaction, involvement, and intrinsic motivation.

Hypothesis Testing

In order to clarify the results of the hypothesis testing, the hypothesis is first stated, and then followed by a brief discussion of the test results.

Hypothesis 1: There is a positive relationship existing between the five core job dimensions and the outcomes of job satisfaction, job involvement, and intrinsic motivation. The testing supported this hypothesis and provides substantial support for this facet of Hackman and Oldham's (1976) job characteristics model. Job satisfaction generally displayed the highest correlations with the core job dimensions and MPS, followed by intrinsic motivation and then job involvement. The job dimension of skill variety displayed the second highest correlations with all outcomes, while task identity displayed the lowest correlations with all outcomes.

Hypothesis 2: Organizational differences moderate the relationship between the job dimensions and the outcomes. The testing failed to support this hypothesis. None of the differences in correlation coefficients were significant at the .05 level.

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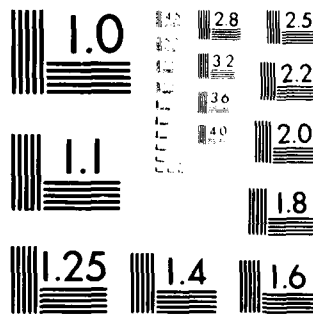
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Hypothesis 3: Growth need strength moderates the relationship between the job dimensions and the outcomes. The testing failed to support this hypothesis. None of the differences in correlation coefficients were significant at the .05 level. These results do not support the moderating effect of GNS as proposed by the job characteristics model of Hackman and Oldham (1976).

Hypothesis 4: The basket SPO group has a higher overall MPS than the super SPO group. The testing failed to support this hypothesis, but instead supported an alternative hypothesis that the super SPO group has a significantly higher overall MPS than the basket SPO.

Hypothesis 5: The basket SPO group is more job satisfied, job involved, and intrinsically motivated than the super SPO group. Testing does not support this hypothesis, but instead supports an alternative hypothesis that the super SPO group is significantly more job satisfied and job involved than the basket SPO group. There were no significant differences between groups for intrinsic motivation.

Hypothesis 6: Pilots in the super SPO group are more job satisfied, job involved, and intrinsically motivated than either navigators or nonrated personnel in the same group. Testing does not support this hypothesis. There were no significant differences between pilots, navigators, or nonrated personnel in the super SPO group.

Hypothesis 7: Navigators in the basket SPO group are more job satisfied, job involved, and intrinsically motivated than either pilots or nonrated personnel in the same group. Testing provides partial support for this hypothesis. Navigators were significantly more job involved and intrinsically motivated than pilots (or pilots and nonrated taken together), and more intrinsically motivated than nonrated personnel in the basket SPO group. All other differences were insignificant.

Hypothesis 8: Program managers (27XX DAFSC) are more job satisfied, job involved, and intrinsically motivated than other types of specialty codes. Testing provides very limited support of this hypothesis. Program managers are more job satisfied than other job types only if all other job types are taken as a group. There were no significant differences between involvement and internal motivation with all other job types taken as a group, and no significant differences for any of the outcomes with other job types taken individually.

Hypothesis 9: Individuals with higher growth need strengths have higher mean scores on the measures of core job dimensions, overall MPS, and outcomes than individuals with lower growth need strengths. Testing provides very strong support for this hypothesis. Of all the comparisons, only job involvement fails to show a significant difference between the two GNS groups.

In summary, the positive relationship aspect of the job characteristics model is supported, while the moderating effects aspect (as determined by differences in the relationship) is not. Organizational differences do affect the overall MPS scores, and since the MPS is an overall measure of job characteristics, can be assumed to affect at least some of the individual job characteristics. Occupational differences appear to exert a limited effect upon the outcomes, although this effect was demonstrated only for navigators in the basket SPO group. Taken individually, there seems to be no significant differences between job types with respect to outcomes. Although GNS does not moderate the relationship between job dimensions and outcomes, GNS does substantially moderate the level of these dimensions, MPS, and the outcomes of job satisfaction and intrinsic motivation.

Recommendations

Because the results of this thesis provide mixed support for the Hackman and Oldham (1976) job characteristics model, further research appears justified. This particular model appears to effectively capture the interactive nature of job characteristics and personal outcomes, but does not appear to completely capture the moderating effects of either individual or organizational differences upon those interactions. This failure may be due, at least in part, to the

type of individuals comprising the sample population used for this study. It is possible that there does not exist within the military SPO environment sufficient population variance to provide an accurate test for the job characteristics model. To examine this possibility, it is recommended that this study approach be replicated with a civilian population working at civilian jobs which match as much as possible the jobs surveyed in this study.

Since the results of this thesis provide significant support that individual differences moderate the levels of job dimensions, MPS, and certain personal outcomes, it is suggested that further research in this area may lead to identification of areas where job enrichment could be effectively utilized. With this in mind, baseline data for the SPO organizations surveyed is presented in Appendix E.

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Vita

David L. Henson was born in Atascadero, California, on 2 December 1946. He was graduated from Paso Robles High School in 1964 and from the Air Force Academy in 1968 with a B.S. in Engineering Sciences.

After completion of Undergraduate Navigator Training at Mather Air Force Base, California, in 1969, he attended a conversion training program for the F-4 at George Air Force Base, California. He then served as a squadron Weapons Systems Officer at MacDill Air Force Base, Florida, Korat RTAFB, Thailand, and Seymour-Johnson Air Force Base, North Carolina. While at Seymour-Johnson Air Force Base, he also served as the 4th Tactical Fighter Wing Weapons Systems Officer, as well as the wing Electronic Warfare Officer.

From 1975 until 1978 he served on an exchange program with a Royal Air Force F-4 air defense squadron at RAF Leuchars, Scotland. Captain Henson then entered the Air Force Institute of Technology in August, 1978.

Permanent Address: P.O. Box 262
San Miguel, California

APPENDIX A
Thesis Survey

PRIVACY STATEMENT

In accordance with paragraph 8, AFR 12-35, the following information is provided as required by the Privacy Act of 1974:

a. Authority

(1) 5 U.S.C. 301, Departmental Regulations: and/or

(2) 10 U.S.C. 80-12, Secretary of the Air Force, Powers and Duties, Delegation by.

b. Principal purposes. The survey is being conducted to collect information to be used in research aimed at illuminating and providing inputs to the solution of problems of interest to the Air Force and/or DOD.

c. Routine uses. The survey data will be converted to information for use in research of management related problems. Results of the research based on the data provided, will be included in written master's thesis and may also be included in published articles, reports, or texts. Distribution of the results of the research, based on the survey data, whether in written form or orally, presented will be unlimited.

d. Participation in this survey is entirely voluntary.

e. No adverse action of any kind may be taken against any individual who elects not to participate in any or all of this survey.

PART I

In answering the following questions about yourself, please circle or fill in the appropriate response.

1. What is your present grade?
a. 2nd Lt b. 1st Lt c. Capt d. Maj e. Lt Col
2. What is the length of your total active commissioned service?
_____ years
3. What is the length of time you have worked at your present job?
_____ months
4. What is your highest level of education?
a. Bachelor's degree
b. Bachelor's degree and some graduate work
c. Master's degree
d. Master's degree and some postgraduate work
e. Doctorate
5. What is your sex?
a. Female b. Male
6. What is your present aeronautical rating?
a. Pilot
b. Navigator
c. Nonrated
7. What is your career status?
a. Regular
b. Career reserve
c. Reserve
8. Please circle your duty Air Force Specialty Code (DAFSC)
a. 26XX d. 51XX g. 67XX
b. 27XX e. 55XX h. Other
c. 28XX f. 65XX

9. Please circle the response that includes the organization for which you work.
- a. Comptroller (AC), Deputy for Engineering (EN), Deputy for Procurement and Manufacturing (PM), or Deputy for Development Planning (XR).
 - b. Deputy for Systems (SD), Deputy for Aeronautical Equipment (AE), Deputy for Propulsion (YZ), or Deputy for Strategic Systems (YY).
 - c. Deputy for F-16 (YP), Deputy for F-15 (YF), or Deputy for A-10 (YX).
 - d. Other.
10. Are the presently a supervisor?
- a. Yes
 - b. No
11. Which of the following best describes your job?
- a. Scientist
 - b. Engineer
 - c. Manager
 - d. Other _____

PART II

Following each statement, please circle one of the seven responses on the scale ranging from VERY LITTLE to VERY MUCH that best describes the amount of the particular job characteristic associated with your job. The midpoint of the scale (4) indicates that your job has a MODERATE amount of the particular job characteristic.

1. How much autonomy is there on your job? To what extent does your job permit you to decide on your own how to go about doing the work?

1	2	3	4	5	6	7
VERY LITTLE			MODERATE			VERY MUCH
Job allows almost no personal control						Job allows almost total personal control

2. To what extent does your job involve doing a complete and identifiable piece of work? Is the job a complete piece of work that has an obvious beginning and end, or is it a component or subsystem of the overall piece of work?

1 2 3 4 5 6 7

VERY LITTLE
Job involves
small part
of overall
piece of work

MODERATE

VERY MUCH
Job involves
complete
piece of work

3. How much variety is there in your job? To what extent does the job require you to do many different things at work, using a variety of your skills and talents?

1 2 3 4 5 6 7

VERY LITTLE
Job requires
same skills
and talents

MODERATE

VERY MUCH
Job requires
different
skills and
talents

4. How much significance or importance is associated with your job? Are the job results likely to significantly affect the lives or well-being of other people?

1 2 3 4 5 6 7

VERY LITTLE
Results not
likely to
have important
effects

MODERATE

VERY MUCH
Results very
likely to
have impor-
tant effects

5. To what extent do supervisors or co-workers let you know how well you are doing on the job?

1 2 3 4 5 6 7

VERY LITTLE
Almost never
know

MODERATE

VERY MUCH
Almost
always know

6. To what extent does doing the job itself provide you with information about how well you are doing on your job?

1	2	3	4	5	6	7
VERY LITTLE Job itself provides almost no feedback			MODERATE			VERY MUCH Job itself provides almost con- stant feedback

PART III

Following each statement, please circle one of the seven responses on the scale ranging from COMPLETELY INACCURATE to COMPLETELY ACCURATE that best indicates how accurately the statement describes your job. The midpoint of the scale (4) indicates that you are UNCERTAIN or are UNDECIDED about the accuracy of the statement.

1. The job requires me to use a number of complex or high-level skills.

1	2	3	4	5	6	7
COMPLETELY INACCURATE			UNCERTAIN			COMPLETELY ACCURATE

2. Most people on this job feel a great sense of personal satisfaction when they do the job well.

1	2	3	4	5	6	7
COMPLETELY INACCURATE			UNCERTAIN			COMPLETELY ACCURATE

3. The job is arranged so that I do not have the chance to do an entire piece of work from beginning to end.

1	2	3	4	5	6	7
COMPLETELY INACCURATE			UNCERTAIN			COMPLETELY ACCURATE

4. People on this job often think of quitting.

1 2 3 4 5 6 7

COMPLETELY
INACCURATE

UNCERTAIN

COMPLETELY
ACCURATE

5. Just doing the work required by the job provides many chances for me to figure out how well I am doing.

1 2 3 4 5 6 7

COMPLETELY
INACCURATE

UNCERTAIN

COMPLETELY
ACCURATE

6. Most people are very satisfied with the job.

1 2 3 4 5 6 7

COMPLETELY
INACCURATE

UNCERTAIN

COMPLETELY
ACCURATE

7. The job is quite simple and repetitive.

1 2 3 4 5 6 7

COMPLETELY
INACCURATE

UNCERTAIN

COMPLETELY
ACCURATE

8. Most people feel bad or unhappy when they find that they have performed the work poorly.

1 2 3 4 5 6 7

COMPLETELY
INACCURATE

UNCERTAIN

COMPLETELY
ACCURATE

9. The supervisors and co-workers on this job never provide feedback about how well I am doing the work.

1 2 3 4 5 6 7

COMPLETELY
INACCURATE

UNCERTAIN

COMPLETELY
ACCURATE

10. This job is one where a lot of other people can be affected by how well the job gets done.

1 2 3 4 5 6 7

COMPLETELY
INACCURATE

UNCERTAIN

COMPLETELY
ACCURATE

11. The job denies me any chance to use my personal initiative or judgment in carrying out the work.

1	2	3	4	5	6	7
COMPLETELY INACCURATE			UNCERTAIN		COMPLETELY ACCURATE	

12. Supervisors often let me know how well they think I am performing the job.

1	2	3	4	5	6	7
COMPLETELY INACCURATE			UNCERTAIN		COMPLETELY ACCURATE	

13. The job provides me the chance to completely finish the pieces of work I begin.

1	2	3	4	5	6	7
COMPLETELY INACCURATE			UNCERTAIN		COMPLETELY ACCURATE	

14. The job itself provides very few clues about whether or not I am performing well.

1	2	3	4	5	6	7
COMPLETELY INACCURATE			UNCERTAIN		COMPLETELY ACCURATE	

15. The job gives me considerable opportunity for independence and freedom in how I do the work.

1	2	3	4	5	6	7
COMPLETELY INACCURATE			UNCERTAIN		COMPLETELY ACCURATE	

16. The job itself is not very significant or important in the broader scheme of things.

1	2	3	4	5	6	7
COMPLETELY INACCURATE			UNCERTAIN		COMPLETELY ACCURATE	

PART IV

Following each statement, please circle one of the seven responses on the scale ranging from COMPLETELY DISAGREE to COMPLETELY AGREE that best describes the extent of your agreement or disagreement with the statement. The midpoint of the scale (4) indicates that you are UNDECIDED or have NO OPINION about the correctness of the statement.

1. My opinion of myself goes up when I do this job well.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

2. Generally speaking, I am very satisfied with this job.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

3. I feel a great sense of personal satisfaction when I do this job well.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

4. I frequently wish I could quit this job.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

5. I feel bad or unhappy when I discover that I have performed poorly on this job.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

6. I am generally satisfied with the work I do on this job.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

7. My own feelings are generally not affected much one way or the other by how well I do on this job.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

PART V

Following each statement, please circle one of the seven responses on the scale ranging from MINIMUM AMOUNT to MAXIMUM AMOUNT that best describes how much of the particular job characteristic you would like to have on your job if given your choice. The midpoint of the scale (4) indicates your preference for a MODERATE AMOUNT OF the job characteristic.

1. A feeling of self-esteem or self-respect.

1	2	3	4	5	6	7
MINIMUM AMOUNT			MODERATE AMOUNT			MAXIMUM AMOUNT

2. Stimulating and challenging work.

1	2	3	4	5	6	7
MINIMUM AMOUNT			MODERATE AMOUNT			MAXIMUM AMOUNT

3. Chances to exercise independent thought and action.

1	2	3	4	5	6	7
MINIMUM AMOUNT			MODERATE AMOUNT			MAXIMUM AMOUNT

4. Opportunity to complete a whole piece of work.

1	2	3	4	5	6	7
MINIMUM AMOUNT			MODERATE AMOUNT			MAXIMUM AMOUNT

5. Opportunities to learn new things.

1	2	3	4	5	6	7
MINIMUM AMOUNT			MODERATE AMOUNT			MAXIMUM AMOUNT

6. High salary and good fringe benefits.

1	2	3	4	5	6	7
MINIMUM AMOUNT			MODERATE AMOUNT			MAXIMUM AMOUNT

7. Opportunities to be creative and imaginative.

1	2	3	4	5	6	7
MINIMUM AMOUNT			MODERATE AMOUNT			MAXIMUM AMOUNT

8. Opportunities for increased responsibilities.

1	2	3	4	5	6	7
MINIMUM AMOUNT			MODERATE AMOUNT			MAXIMUM AMOUNT

9. A sense of worthwhile accomplishment.

1	2	3	4	5	6	7
MINIMUM AMOUNT			MODERATE AMOUNT			MAXIMUM AMOUNT

10. Opportunities for personal growth and development.

1	2	3	4	5	6	7
MINIMUM AMOUNT			MODERATE AMOUNT			MAXIMUM AMOUNT

PART V

Following each statement, please circle one of the seven responses on the scale ranging from COMPLETELY DISAGREE to COMPLETELY AGREE that best describes the extent of your agreement or disagreement with the statement. The midpoint of the scale (4) indicates that you are UNDECIDED or UNCERTAIN about the statement.

1. I'll stay overtime to finish a job, even if I'm not required to do so.

1	2	3	4	5	6	7
COMPLETELY DISAGREE		UNDECIDED				COMPLETELY AGREE

2. You can measure a person pretty well by how good a job he/she does.

1	2	3	4	5	6	7
COMPLETELY DISAGREE		UNDECIDED				COMPLETELY AGREE

3. The major satisfaction in my life comes from my work.

1	2	3	4	5	6	7
COMPLETELY DISAGREE		UNDECIDED				COMPLETELY AGREE

4. For me, mornings at work really fly by.

1	2	3	4	5	6	7
COMPLETELY DISAGREE		UNDECIDED				COMPLETELY AGREE

5. I usually show up for work a little early, to get things ready.

1	2	3	4	5	6	7
COMPLETELY DISAGREE		UNDECIDED				COMPLETELY AGREE

6. The most important things that happen to me involve my work.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

7. Sometimes I lie awake at night thinking ahead to the next day's work.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

8. I'm really a perfectionist about my work.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

9. I feel depressed when I fail at something connected with my job.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

10. I have other activities more important than my work.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

11. I live, eat, and breathe my work.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

12. I would probably keep working even if I didn't need the money.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

13. Quite often I feel like staying home from work instead of coming in.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

14. To me, work is only a small part of who I am.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

15. I am very much involved personally with my work.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

16. I avoid taking on extra duties and responsibilities in my work.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

17. I used to be more ambitious about my work than I am now.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

18. Most things in life are more important than work.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

19. I used to care more about my work, but now other things are more important to me.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED			COMPLETELY AGREE

20. Sometimes I'd like to kick myself for the mistakes I make in my work.

1	2	3	4	5	6	7
COMPLETELY DISAGREE			UNDECIDED		COMPLETELY AGREE	

PART VII

The following are general questions concerning your feelings about your present job. For purposes of this survey, the term "job" is defined as your specific position within the USAF (e.g. program manager at ASD) and not your occupation of USAF officer.

1. Choose the one of the following statements which best tells how well you like your job.
 - a. I hate it.
 - b. I dislike it.
 - c. I don't like it.
 - d. I am indifferent to it.
 - e. I like it.
 - f. I am enthusiastic about it.
 - g. I love it.
2. Which one of the following best tells how you feel about changing your job?
 - a. I would quit this job at once if I could.
 - b. I would take almost any other job in which I could earn as much as I am earning now.
 - c. I would like to change both my job and my occupation.
 - d. I would like to exchange my job for another one.
 - e. I am not eager to change my job, but I would do so if I could get a better job.
 - f. I cannot think of any jobs for which I would exchange.
 - g. I would not exchange my job for another job.
3. Which one of the following shows how you think you compare with other people?
 - a. No one likes his job better than I like mine.
 - b. I like my job much better than most people like theirs.
 - c. I like my job better than most people like theirs.
 - d. I like my job about as well as most people like theirs.
 - e. I dislike my job more than most people dislike theirs.
 - f. I dislike my job much more than most people dislike theirs.
 - g. No one dislikes his job more than I dislike mine.

4. Which one of the following shows how much of the time you feel satisfied with your job?

- a. All the time.
- b. Most of the time.
- c. A good deal of the time.
- d. About half of the time.
- e. Occasionally.
- f. Seldom
- g. Never

Please place the completed questionnaire in the attached envelope and drop it in the mail as soon as possible. Thank you very much for your time and effort.

COMMENTS:

APPENDIX B

Scoring Key for Survey Measures

This survey measures several characteristics of jobs, personal and work outcomes, and the growth need strength of the respondents. Each variable measured by the survey is listed below along with (a) the scale of the measure and (b) a list of the survey items which are averaged to form a summary score for that variable. Those questions which are marked with an (*) indicate reversed scoring (1=7, 2=6, 3=5, 4=4, 5=3, 6=2, 7=1).

I. JOB DIMENSIONS:

A. Skill Variety: Scale of 1 to 7.

Average the following questions:

Section Two	#3 (II3)
Section Three	#1 (III1)
Section Three	#7 (III7)*

B. Task Identity: Scale of 1 to 7.

Average the following questions:

Section Two	#2 (II2)
Section Three	#3 (III3)*
Section Three	#13 (III13)

C. Task Significance: Scale of 1 to 7.

Average the following questions:

Section Two	#4 (II4)
Section Three	#10 (III10)
Section Three	#16 (III16)*

D. Autonomy: Scale of 1 to 7.

Average the following questions:

Section Two	#1 (II2)
Section Three	#11 (III11)*
Section Three	#15 (III15)

E. Feedback: Scale of 1 to 7.

Average the following questions:

Section Two	#6 (II6)
Section Three	#5 (III5)
Section Three	#14 (III14)*

II. PERSONAL AND WORK OUTCOMES:

A. Job Satisfaction: Scale of 1 to 7.

Average the following questions:

Section Seven	#1 (VII1)
Section Seven	#2 (VII2)
Section Seven	#3 (VII3)*
Section Seven	#4 (VII4)*

B. Job Involvement: Scale of 1 to 7.

Average the following questions:

Section Six	#3 (VI3)
Section Six	#6 (VI6)
Section Six	#10 (VI10)*
Section Six	#11 (VI11)
Section Six	#14 (VI14)*

C. Intrinsic Motivation: Scale of 1 to 7.

Average the following questions:

Section Three	#8 (III8)
Section Four	#1 (IV1)
Section Four	#5 (IV5)
Section Four	#7 (IV7)*

III. INDIVIDUAL GROWTH NEED STRENGTH: Scale of 1 to 7.

Average the following questions:

Section Five	#2 (V2)
Section Five	#3 (V3)
Section Five	#5 (V5)
Section Five	#7 (V7)
Section Five	#9 (V9)
Section Five	#10 (V10)

IV. MOTIVATING POTENTIAL SCORE (MPS): Scale of 1 to 343.

$$\text{MPS} = \frac{\begin{array}{c} \text{Skill} \\ \text{Variety} \end{array} + \begin{array}{c} \text{Task} \\ \text{Identity} \end{array} + \begin{array}{c} \text{Task} \\ \text{Significance} \end{array}}{3} \times \text{Autonomy} \times \text{Feedback}$$

APPENDIX C

Factor Analysis for Individual Measures

Table C-1
Results of Factor Analysis of
Intrinsic Motivation Questions

First Principal Component

<u>Question</u>	<u>Factor 1</u>	<u>Factor 2</u>
III2	.59016	-.50734*
III8	.47455	.42569*
IV1	.71827	-.17763
IV3	.82320	-.30236
IV5	.43830*	.71146
IV7	.71024	.22817

After Varimax Rotation

<u>Question</u>	<u>Factor 1</u>	<u>Factor 2</u>
III2	.77400	-.08128
III8	.14792	.62010
IV1	.69169	.26274
IV3	.84895	.21990
IV5	-.04453	.83445
IV7	.45413*	.59183

Notes:

a. n = 397

b. * indicates loading on additional factor greater than 0.40.

Table C-2
Results of Factor Analysis of Job Involvement Questions

Question	First Principal Component				
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
VI1	.57566	-.10340	.28995	-.18030	-.00618
VI2	.39234	.21005	.27669	.30075	-.32745
VI3	.67955	.28408	-.34883	-.01410	-.08926
VI4	.60683	-.17817	.10216	-.08763	-.15852
VI5	.45762*	-.03602	.11982	.06437	-.45875
VI6	.67720	.34150	-.38148	.09501	-.15344
VI7	.46279	.29981	.24856	.09675	.13675
VI8	.43830	.21204	.34039	.20753	-.17901
VI9	.39267	.40500*	.41039	.08646	.29349
VI10	.54665	.12183	-.46556*	.11758	.24558
VI11	.52933	.40690*	-.17197	-.19387	-.08607
VI12	.39704	-.08273	.10324	-.65815	.03873
VI13	.45182	-.35834	-.03314	-.28180	-.28436
VI14	.57125	-.04471	-.42124*	.15123	.10853
VI15	.72906	.02458	.22458	-.16636	-.03532
VI16	.41495*	-.43204	.21872	-.05021	.26988
VI17	.49868*	-.56043	.08249	.33791	.04422
VI18	.58074	-.29586	-.19791	-.16289	.31563
VI19	.49065*	-.51260	-.00175	.38700	.11402
VI20	.23828	.37419	.24356	.01676	.49323

(Table C-2 cont.)

After Varimax Rotation

Question	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
VI1	.08411	.26069	.49944	.28041	.23576
VI2	.10174	.06062	-.03049	.65548	.16635
VI3	.74499	.01319	.20319	.25455	.10521
VI4	.21627	.30919	.42961	.34026	.02282
VI5	.15582	.11891	.23084	.57759	-.11975
VI6	.79020	-.00540	.09777	.33494	.08451
VI7	.20030	.07129	.10648	.29425	.50078
VI8	.08344	.08734	.06788	.56457	.30018
VI9	.07950	.01835	.07758	.23938	.71433
VI10	.72516	.22414	.01742	-.07017	.15239
VI11	.55227	-.20264	.28902	.22404	.20132
VI12	.09086	-.03398	.76591	-.06651	.09677
VI13	.14741	.24793	.54212	.20347	-.27463
VI14	.65060	.33537	.05886	.03287	.01113
VI15	.26336	.22194	.52018	.36852	.29407
VI16	-.04105	.56908	.35344	-.02989	.17519
VI17	.08444	.78756	.09215	.21764	-.04973
VI18	.40103*	.47037	.40679*	-.17693	.10616
VI19	.16327	.78370	.01441	.15743	-.02085
VI20	.10504	-.00683	.02019	-.06466	.69570

APPENDIX D

Factor Analysis for Selected Subgroups

Table D-1
Results of Factor Analysis for Basket SPO Group

<u>Question</u>	<u>Factor 1</u>	<u>Factor 2</u>	<u>Factor 3</u>
III8	-.02552	-.10152	.64289
IV1	.35538	.16882	.46130
IV5	-.06170	.08496	.71163
IV7	.35976	.14289	.67853
VI3	.16901	.82295	.06179
VI6	.17611	.84448	.04928
VII0	.19345	.66746	.00118
VII1	.07137	.57727	.00367
VII4	.13571	.61010	.11046
VIII1	.87690	.21128	.11239
VII2	.83909	.15700	-.02009
VII3	.85373	.21446	.09759
VII4	.86002	.17780	.11590
n = 282			

Table D-2
Results of Factor Analysis for Super SPO Group

<u>Question</u>	<u>Factor 1</u>	<u>Factor 2</u>	<u>Factor 3</u>
III8	.02013	.12705	.76797
IV1	.38474	.18692	.50088
IV5	-.09002	-.02699	.72852
IV7	.30513	-.00874	.65327
VI3	.01243	.81166	.01882
VI6	.10799	.84075	.04650
VI10	.12342	.69147	.03514
VI11	.12398	.70194	.06996
VI14	.20940	.65747	.07282
VII1	.90339	.15687	.08325
VII2	.83312	-.02652	.10254
VII3	.84379	.26468	.10373
VII4	.84157	.22496	.04947
n = 117			

Table D-3
Results of Factor Analysis for Low GNS Group

<u>Question</u>	<u>Factor 1</u>	<u>Factor 2</u>	<u>Factor 3</u>
III8	-.23272	.10069	.66938
IV1	.17403	.04065	.73279
IV5	.24063	.05692	.49428
IV7	.47352	-.01490	.53282
VI3	.01890	.85023	.16950
VI6	.03080	.84723	.13654
VII10	.36854	.58892	-.05260
VII11	.07973	.70561	.01087
VII14	.27104	.54447	-.00557
VIII1	.82969	.25235	.14452
VII2	.76239	.08029	.06610
VII3	.86324	.18934	.07178
VII4	.79723	.13652	.13843
n = 140			

Table D-4
Results of Factor Analysis for High GNS Group

<u>Question</u>	<u>Factor 1</u>	<u>Factor 2</u>	<u>Factor 3</u>
III8	.09753	-.17930	.76530
IV1	.41862	.17793	.17476
IV5	-.20898	.24736	.58978
IV7	.35767	.10182	.65313
VI3	.12971	.82566	.00299
VI6	.25028	.82847	.16295
VI10	.14966	.60852	-.01259
VI11	.08928	.58704	.27133
VI14	.17224	.66875	-.12777
VII1	.89953	.20587	-.00583
VII2	.85380	.11825	.00562
VII3	.84456	.23949	.09628
VII4	.89697	.12071	.00062
n = 120			

APPENDIX E
Baseline Information

Table E-1
Means and Variances of Scores
All Cases

<u>JOB DIMENSIONS</u>	<u>MEAN</u>	<u>S.D.</u>
Skill Variety	5.453	1.228
Task Identity	4.625	1.480
Task Significance	5.378	1.377
Autonomy	5.462	1.278
Feedback from Job	4.822	1.356
Overall MPS	148.732	77.998
<u>AFFECTIVE RESPONSES TO THE JOB</u>		
Job Satisfaction	4.859	1.049
Job Involvement	3.037	1.243
Intrinsic Motivation	5.641	.912
<u>GROWTH NEED STRENGTH</u>		
"Would Like" Format	6.267	.875

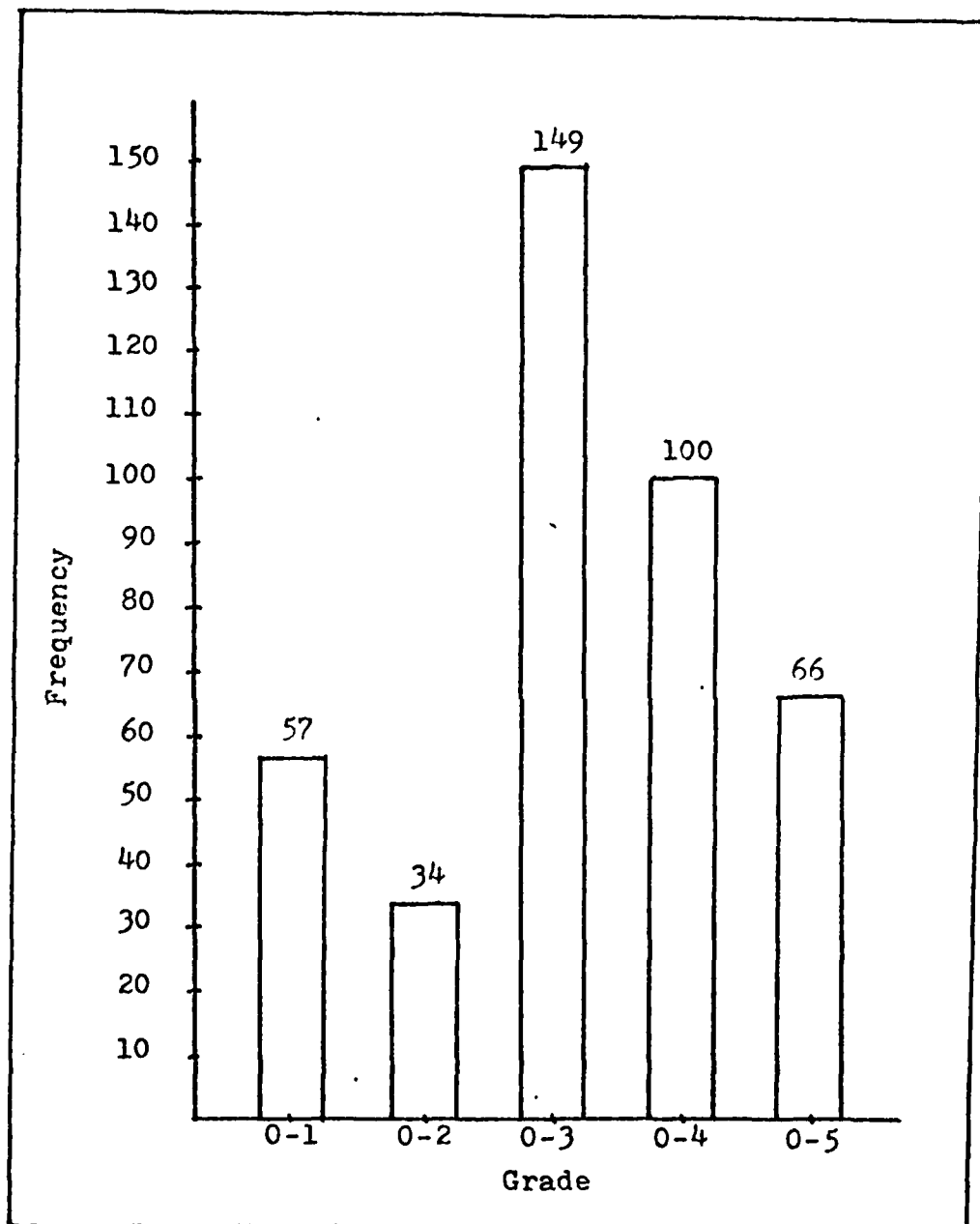


Figure 4. Frequency vs Grade

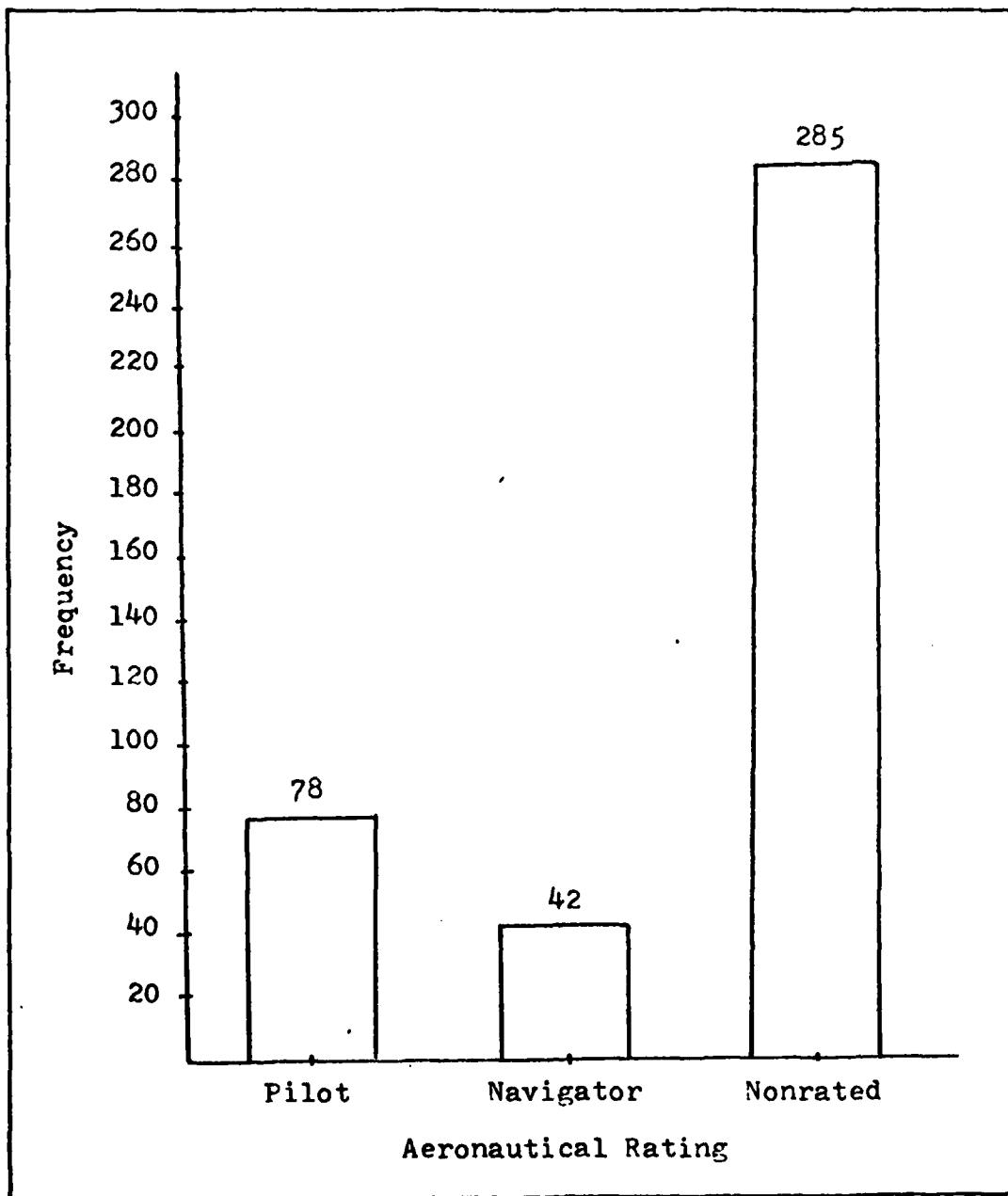


Figure 5. Frequency vs Aeronautical Rating

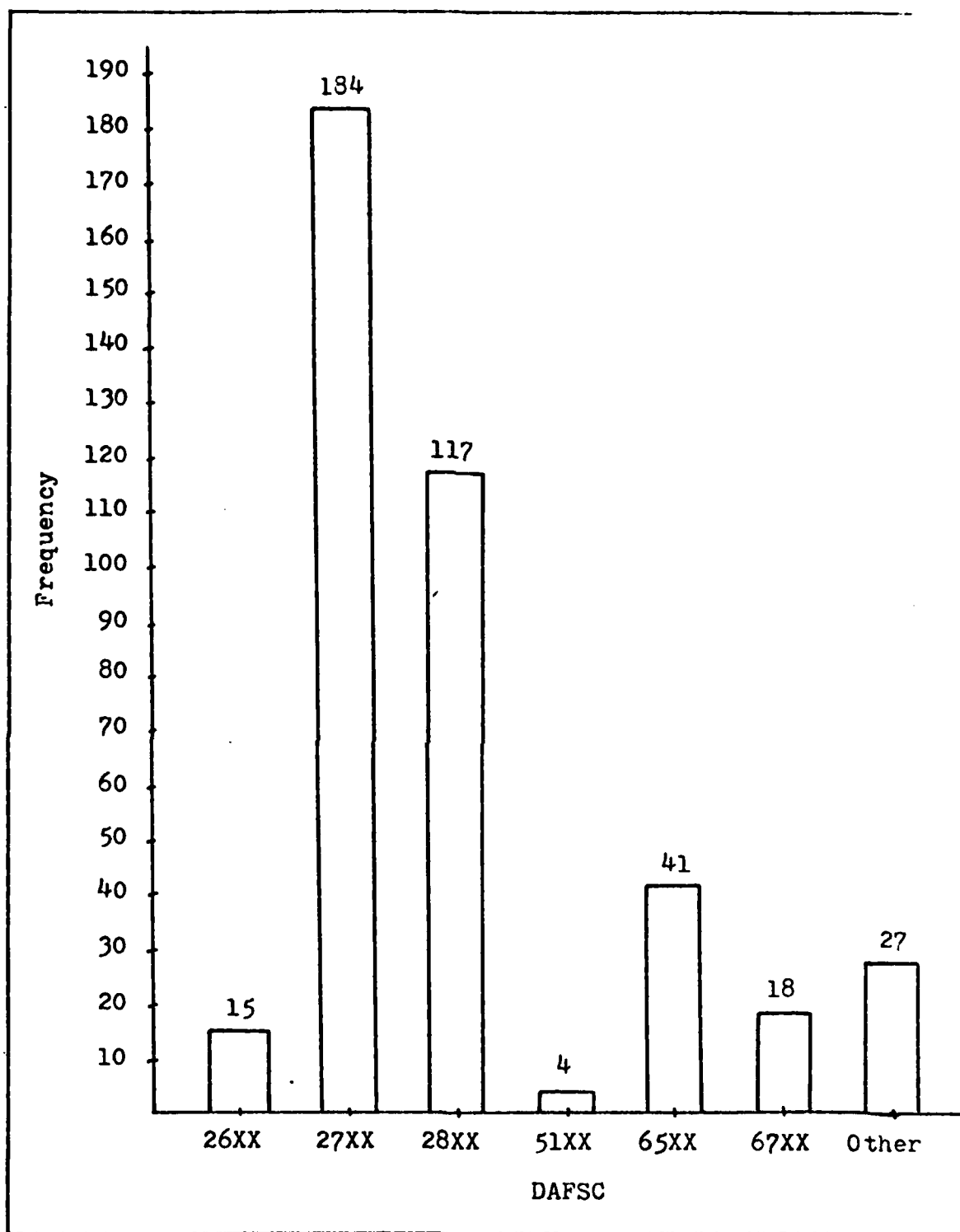


Figure 6. Frequency vs DAFSC

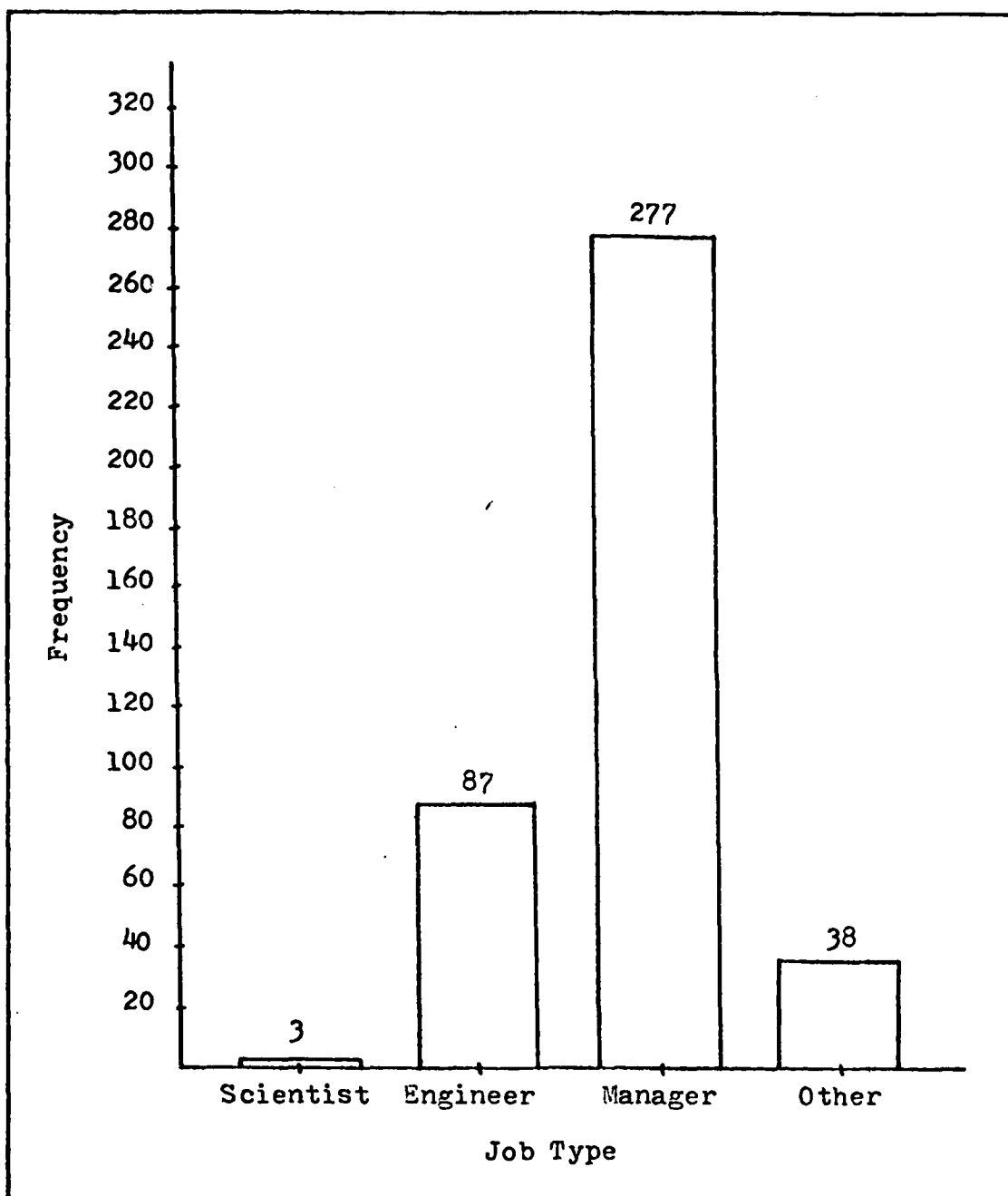


Figure 7. Frequency vs Job Type

APPENDIX F
Z Transform Table

Table F-1
Z Transform Table

Table of $z = \frac{1}{2} \log_e \frac{(1+r)}{(1-r)}$ to Transform the Correlation Coefficient										
r	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
.0	0.000	0.010	0.020	0.030	0.040	0.050	0.060	0.070	0.080	0.090
.1	.100	.110	.121	.131	.141	.151	.161	.172	.182	.192
.2	.203	.213	.224	.234	.245	.255	.266	.277	.288	.299
.3	.310	.321	.332	.343	.354	.365	.377	.388	.400	.412
.4	.424	.436	.448	.460	.472	.485	.497	.510	.523	.536
.5	.549	.563	.576	.590	.604	.618	.633	.648	.662	.678
.6	.693	.709	.725	.741	.758	.775	.793	.811	.829	.848
.7	.876	.887	.908	.929	.950	.973	.996	1.020	1.045	1.071
.8	1.099	1.127	1.157	1.188	1.221	1.256	1.293	1.333	1.376	1.422
r	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
.90	1.472	1.478	1.483	1.488	1.494	1.499	1.505	1.510	1.516	1.522
.91	1.528	1.533	1.539	1.545	1.551	1.557	1.564	1.570	1.576	1.583
.92	1.589	1.596	1.602	1.609	1.616	1.623	1.630	1.637	1.644	1.651
.93	1.658	1.666	1.673	1.681	1.689	1.697	1.705	1.713	1.721	1.730
.94	1.738	1.747	1.756	1.764	1.774	1.783	1.792	1.802	1.812	1.822
.95	1.832	1.842	1.853	1.863	1.874	1.886	1.897	1.909	1.921	1.933
.96	1.946	1.959	1.972	1.986	2.000	2.014	2.029	2.044	2.060	2.076
.97	2.092	2.109	2.127	2.146	2.165	2.185	2.205	2.227	2.249	2.273
.98	2.298	2.323	2.351	2.380	2.410	2.443	2.477	2.515	2.555	2.599
.99	2.646	2.700	2.759	2.826	2.903	2.994	3.106	3.250	3.453	3.800

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The primary purpose of this thesis is to investigate the moderating effects of organizational differences and individual differences on the relationships existing between job characteristics and intrinsic motivation, job involvement, and job satisfaction. Measures used to describe the job characteristics and intrinsic motivation are derived from the short form version of the Job Diagnostic Survey (JDS) developed by Hackman and Oldham (1974). The		

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measures used to describe job involvement and job satisfaction are derived from scales developed by Lodahl and Kejner (1965) and Hoppock (1935), respectively.

A survey was distributed to 872 officers, grade O-1 through O-5, who were members of 8 Systems Program Offices (SPO) within the Aeronautical Systems Division, Wright-Patterson AFB, Ohio. In order to obtain meaningful responses based upon adequate job experience, only respondents working at their present jobs longer than six months were included in the data base. Of the 579 surveys returned, 409 met this arbitrary time limit and were usable for data analysis.

Analysis of the data confirmed that a positive relationship existed between the objective job characteristics and the outcomes of job satisfaction, job involvement, and intrinsic motivation. This relationship, however, was not moderated by either organizational or individual differences.

Organizational and individual differences did appear to exert a moderating effect on the levels of individual job characteristics, the overall Motivating Potential Score (MPS), and the outcomes of job satisfaction, job involvement, and intrinsic motivation.

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